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ABSTRACT

This document contains the following papers on telecommunications for preservice teachers from the SITE (Society for Information Technology & Teacher Education) 2001 conference: (1) "Regional List Servers as a Means of Peer Support for an On-Line Learning Community" (John Green); (2) "The Imfundo Project: ICT in Teacher Education in Developing Countries" (Michelle Selinger); (3) "The Handheld Web: Using Mobile Wireless Technologies To Enhance Teacher Professional Development" (Paul Shotsberger); and (4) "Electronic/Distance Preservice Teacher Education: An Example" (Leon Wickham). Most papers contain references. (AA)

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ED 457 843

# TELECOMMUNICATIONS: PRESERVICE APPLICATIONS

**Section Editor:**
**Trudy Abramson,** *Nova Southeastern University*

The overview paragraphs have been organized by the last name of the first author. As the reader moves from paper to paper in this section, it is important to remember that a uniformity of nomenclature in preservice teacher education does not exist. There is general agreement about foundation courses (beginning) and methods courses (usually intermediate). However, practicum may be part of a methods course or may be the student teaching experience. Usually, practicum is something that takes place in a school under the supervision of a classroom teacher and a college professor. Field experiences may occur anywhere in the teacher preparation sequence. In some places, preservice teachers are undergraduates; in others, they are post-baccalaureate. Each presenter group will define its own circumstances. Each presentation combines the use of electronic technology and preservice teacher education.

### Structuring electronic portfolios using web-based document management

Eric Aplyn and Carl Hoagland of the University of Missouri at St. Louis discuss solutions they are framing to overcome barriers to institutional implementation of electronic portfolios. This will be a discussion of a work-in-progress. The authors are devlopng experiemental portfolios with a web-based knowledge-sharing technology developed by Xerox Corpostation canned DocuShare. The presentation will conclude with a full group discussion about the broader issues associated with institutional and regional implementation of electronic portfolios.

### Links to the classroom: Technology in early field experience for elementary social studies

Linda Bennett, University of Missouri at Columbia, presents a paper describing the outcome of her research. The questions she answers are: Did prospective teachers use the Internet to reflect on teaching? How did the prospective teachers use online journals and summative writing to reflect on technology and teaching?

### Factors that promote and inhibit discourse with preservice teachers on a non-restrictive, public web-based forum

Alec Bodzin, Lehigh University, reports on an investigation of asynchronous communication factors that influence the electronic interactions of preservice science teachers. The students were able to access the SciTeach Forum from home, the university and the school in which they were based. The research question was: How does the medium promote or inhibit online discussion?

### Impact of asynchronous discussion on preservice teacher education practicum experiences

Aaron Doering, Marc Johnson, and Sara Dexter, all of the University of Minnesota, address one facet of their PT3 grant, Ed-U-Tech. The players in the online discussions that are the focus of their presentation were college instructors of the methods course, preservice teachers, the middle school cooperating teacher and the middle school pupils. The presentation will detail ways in which the technology has assisted the preservice teachers to conceptualize their future roles as teacher and how the technology enhances the learning process.

### Telementoring to improve literacy: Preservice students as online mentors to K-12 students

Melanie Goldman, Boston College, will conduct a roundtable discussion on the use of Internet-based mentoring and the teaching of writing. At one end are the K-12 students who write to the student teachers at the other end. Through online exchange, the preservice teachers interact directly with school-based children and improve their own writing as they provide guidance. The school children gain audience for their work and personal coaches as they learn to write.

### Preservice teacher education and the Internet: Expanding perspectives toward a profession

Jennifer Gramling and Jamie Nelson, both of University of Tennessee, will present research gathered during the use of an online course management system (CMS) to supplement classroom instruction in a preservice teacher education class. The course title is Introduction to

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Instructional Computing. The CMS used was Blackboard's CourseInfo.

### Regional list servers as a means of peer support for an online learning community

John Green, The Open Polytechnic of New Zealand, describes a process in which regional list servers were introduced to support the online classroom. The objective was to create small, supportive groups on online learners within a large online class. Whereas a chat is real time, a list server is asynchronous and peer support may be built at a less furious pace. The presentation will discuss organization, people, implementation and results.

### Going the distance: Developing guidelines for the creation of online courses

Norma Henderson and LaMont Johnson, both of University of Nevada at Reno, will present standard criteria to guide the development of a quality online course. They will discuss a brief study whose results prompted the guidelines.

### Umm.. I don't think its working: Why our class-to-class E-mail exchange didn't work (and what can be done to fix it)

Lauren McClanahan, Ohio State University and Linda Clady, Westerville City Schools, paired undergraduate teacher education students with middle school students in an E-mail writing project. This presentation traces their experiences.

### Student perceptions of the value of online instruction

Barbara McKenzie, Elizabeth Bennett, Nancy Mims and Tom Davidson, all of the State University of West Georgia, will discuss their use of WebCT, a distance delivery system. Their remarks will encompass student reactions, WebCT tools, the impacts on learning and recommendations for change.

### Connecting trainee teachers and school mentors with university educators via MultiPoint Desktop Video Conferencing (MDVC): The Singapore experience

Swee-Ngoh Moo, Foong-Lin Angela Wong, Leslie Sharpe, and Lachland Crawford are all from the National Institute of Education, Nanyang Technical University, Singapore. This presentation will describe the technology and the pedagogy using a state of the art video conferencing system. The pedagogic aspect relates to the added value to the curriculum of preservice teachers and will focus largely on the quality of the practicum (student-teaching) experience.

### The study of the impact of learners, learning interactions on web-based tutorial program, to satisfaction on the use of web for educational purposes and academic achievement

Jaitip Na-songkhla, Chulalongkorn University, Thailand, will describe the use of a web-based tutorial as a classroom supplement in a freshman-level course, Foundations of Computer for Education. A wide range of participatory activities were provided and participation was encouraged. Feedback questionnaires were administered and analyzed. Results will be shared.

### Research and development on practicum training system for preservice teacher education using Internet in Nara University of Education

Wakio Oyanagi, Nara University of Education, Japan, will present research dealing with the development and evaluation of a system to improve teaching practice using the Internet. The questions explored relate to the practicum in teacher training. Specifically, the Internet is used by the preservice teachers for reflection on observation practice, lecture and practicum.

### Compressed video technology, innovative teaching and realistic experiences: Recommendations for CVT Usage

Gary Rosenthal, Nicholls State University, Barlow Soper, Louisiana Tech University, Lamar Wilkinson, Louisiana Tech University and James Barr, Nicholls State University. This presentation explores the implementation of compressed video teaching (CVT) at a number of universities in Louisiana. This technology allows remote students to see and hear everything that is occurring in each classroom. The presentation will be largely a "lessons learned" recounting and recommendation to new users of the system.

### The Imfundo project: ICT in teacher education in developing countries

Michelle Selinger, Cisco Systems, UK, describes the technology and professional development program in which ICT was used to enhance distance education in underdeveloped countries. She will explain the problems facing teacher training in remote areas such as the sub-Sahara and the ways in which electronic technologies are being used to support teacher preparation programs.

### The handheld web: Using mobile wireless technologies to enhance teacher professional development

Paul Shotsberger, University of North Carolina at Wilmington, discusses use of this new digital technology to connect preservice and inservice teacher training. He will describe a project that infused technology into the undergraduate curriculum for preservice mathematics

teachers, while strengthening the relationships between his university and its partnering public schools.

### Preservice teacher education: Electronic/ distance

Leon Wickham, Massey University, New Zealand, will review the ways in which his university met the challenge for delivering teacher education to those who were unable to attend a traditional program. This alternate teacher education program delivers instruction through the media of the postal system and the World Wide Web.

# Issues in structuring long-term electronic portfolios with web-based document management tools

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At the College of Education of the University of Missouri – St. Louis, we have set out to look for solutions to 3 major barriers we found to institutional implementation of electronic portfolios:

- Fear of being evaluated on visual elements rather than on content,
- No obvious common software platform for portfolio development
- Evaluation and management difficulties with typical storage and software technologies

As a way of overcoming these barriers, we are developing experimental portfolios with a web-based knowledge sharing technology developed by Xerox Corporation. Similar products are available from other software developers with varying costs and varying capabilities. We will provide an overview of our work to date, provide our research on other technologies with similar capabilities, and hope to launch a discussion that explores the broader issues associated with institutional and regional implementation of electronic portfolios using this strategy. One primary concern is the need to address inter-institutional standards, particularly for 2-year to 4-year college transitions and transitions to long-term professional development. Other key issues include student/faculty trust, usability and stability, long-term management, security, and ownership of portfolios.

# Links to the Classroom: Technology in Early Field Experience for Elementary Social Studies

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**Abstract:** This paper describes a model for integrating technology into early field experiences. The focus of the paper is on what technologies were used and how prospective teachers utilized technology in early field experience. Two recommendations are for diverse models of integrating technology into field experience are developed and those diverse strategies for integrating technology into social studies are designed.

## Introduction

What do prospective elementary teachers need to know about technology and how should they utilize technology in teaching social studies in the elementary schools? To address these questions, the International Society of Technology in Education (ISTE) developed profiles for preparing tomorrow's teachers to use technology (2000). ISTE stated six performance profiles for the professional preparation of prospective teachers. The performances are:

(1) technology operations and concepts
(2) planning and designing learning environments and experiences,
(3) teaching, learning, and the curriculum,
(4) assessment and evaluation,
(5) productivity and professional practice, and
(6) social, ethical, legal, and human issues.

Technology is a powerful tool for prospective teachers to communicate and develop knowledge, skills and attitudes about teaching. Students can use electronic communication tools, Internet resources, and multimedia documents to research information, develop inquiry skills, or discuss diverse viewpoints. Communication tools can link professionals, educators, and prospective teachers interested in social studies. Through technological methods such as these a community of learners can be developed (White, 1996). Projects can be developed for prospective teachers to work collaboratively on computer-mediated technologies in the social studies classroom.

As a new resource for education, technology has influenced the nature of teacher education. This study describes how technology was used in an early field experience taken in conjunction with an elementary social studies methods course.

## Research Questions

(1) Did prospective teachers use technology in early field experience?
(2) What technologies did the prospective teachers use to teach social studies?
(3) How did the prospective teachers use technology to teach social studies?

## Methodology

**Participants**

There were twenty-one undergraduate students. All the students were in the first semester of their senior year. Two students were males. The minority participants included one African American student and one Hispanic student.

The students were enrolled in the Social Studies in the Elementary School course and corresponding field experience. The course is a required three-semester hour course for undergraduate elementary teacher education students at a large regional university. The field experience is a required two-semester hour course in which the students are in an elementary classroom from forty to sixty hours during the term.

The location of the field experience was Parkade Elementary School in Columbia, MO. The field experiences were in three fourth grade and four fifth grade eMINTS (enhance Missouri's Instructional Networked Teaching) classrooms. Classrooms are networked, teachers are trained, and each classroom contains a SMART board. The classrooms have between one to four to one to two computers to student ratio. The cooperating teacher, three undergraduate field experience students and approximately twenty elementary students work as a team to apply technology while learning social studies.

The MU Partnership for Preparing Tomorrow's Teachers To Use Technology (PT3) Grant http://www.coe.missouri.edu/~pttut/ provided support for the technology at the university. The Navigator@Parkade and eMINTS (http://emints.more.net/info/central/classpages.htm) provided the technology support for the elementary school.

**Data Collection**

During the fall term of 2000, data were collected using online journals, final reflective papers, interviews, observations, e-mail messages, self-evaluations by prospective teachers, and cooperating teacher evaluations about the field experience and the use of technology. The researcher periodically visited the classrooms and discussed the progress of the project. There were group meetings for the classroom teachers and prospective teachers at the beginning and end of the field experience. The researcher corresponded through e-mail with individuals and groups of prospective teachers and classroom teachers throughout the field experience.

## Findings

**Technology Expectations**

The performance expectations for prospective teachers in the project were:

- Use e-mail, a class discussion list, and online forms
- Design and implement a WebQuest in the classroom
- Design a concept web using Inspiration on a social studies theme
- Design units of study and lessons, which infuse technology into the curriculum
- Building a technology resource list for the social studies curriculum
- Teach the unit in a local elementary school

**Technologies Used**

The technologies used in the elementary classroom were determined by what had been purchased in the grants. The university and the elementary school had access to very compatible hardware and software. The grants supported hardware, Microsoft Office, and Internet connections. Technologies used in the classroom included but were not are limited to the following:

- SMART board (interactive white board)
- Computer stations for small groups for elementary students (1 to 2 ratio)
- Microsoft Office
- Webquest (http://edweb.sdsu.edu/webquest/webquest.html)
- TrackStar (http://scrtec.org/track)
- Inspiration (http://www.inspiration.com/)

- Online forms (http://www.coe.missouri.edu/~esse/reflective.html)
- Web searches and links to web sites
- Electronic communication tools
- Courseinfo web site
- Digital cameras
- Multi-media software such as PowerPoint.

**Integration of Technology into Social Studies Instruction**

The prospective teachers were required to write and implement a social studies unit that integrated technology. The fourth and fifth grade classroom teachers selected the following units for the prospective teachers to teach: The Land and Its People (The United States and Australia), The Oregon Trail, The 2000 Election, Missouri Government, and Colonial America. These are typical units taught in fourth and fifth grade classrooms and the classroom teachers provided a lot of print resources for the prospective teachers to use in planning and implementing the lessons. The new aspect of the lessons would be the use of technology.

The SMART board, PowerPoint, and Web sites were used on a regular basis in the lessons taught by the prospective teachers. For example, the SMART board was use to brainstorm ideas, post information, interact with Web sites, and present projects. The prospective teachers designed WebQuests (http://edweb.sdsu.edu/webquest/webquest.html) for the elementary students to complete a task using selected web sites. TrackStar (http://scrtec.org/track) is a web site that provides a form for teachers to develop a lesson or list of related web sites for students to search.

The lessons included opportunities for elementary students to use technology. Primarily, the Internet was used by the elementary students to complete a task with one or more specific web sites as a resource for information. Typically, PowerPoint was used by the elementary students to developed presentations to demonstrate what they had learned.

The prospective teachers to brainstorm the content for the unit used Inspiration. I am unaware of the Inspiration being used in instruction. It is the only software that was used in the university course that is not in the elementary classroom. The prospective teachers could have downloaded the software but did not. The software has been ordered for the elementary classrooms.

**Technology for Course work**

The university courses were web-assisted and all assignments were on a Courseinfo web site. The prospective teachers used technology to complete the assignments for the university courses. The primary objective for the elementary social studies methods course was to write the social studies unit.

The online forms were used to complete a weekly reflective journal on the field experience. Electronic communication tools were used to share ideas among the prospective teacher, university instructor and classroom teacher. The prospective teachers shared concerns and gave ideas on how to use technology to teach social studies lessons in an elementary school.

**Summary of Technology Use**

The prospective teacher, classroom teacher, and elementary student used technology to plan, implement, and assess the social studies unit the university student was teaching in the elementary classroom. It is difficult to generalize the locus of control in the use of technology. Within each classroom the prospective teacher, classroom teachers and the elementary students determined the use of technology. If any one of the individuals had an interest or need to use technology then they did. In most cases, the opportunities to use the technology were open to anyone.

During the lessons taught by prospective teachers, technology was used in every lesson I observed. Technology was used either by the prospective teacher to introduce the lesson or by the elementary students to complete a task.

Through observations, the researcher made several generalizations about technology in the fourth and fifth grade classrooms. The hardware and the software on the student computer stations functioned without glitches and technical difficulties were not discussed. I observed on one occasion a teacher came from another classroom to help students scan an image into PowerPoint.

Each prospective teacher had some prior technology experience during their professional education course and self selected projects. The SMART boards were a new piece of technology for

everyone in the classroom so some students were nervous about using it. Training sessions to learn the technology were set up at the university as needed. Students prefer for the sessions to be conducted using the elementary school equipment.

## Recommendations

Based on this study, the following recommendations are made for the integration of technology into early field experience.

- Provide training for the prospective teachers on the use of technology and design social studies lessons during the first few weeks of the semester before going to the elementary classroom
- Video taping or teleconferencing to show models for integrating technology into social studies curriculum
- Develop a personal target to learn and effectively use 2 to 3 technology tools in teaching social studies and conduct a follow-up review on the success of the implementation plan
- Use other aspects of Microsoft Office such as Excel to graph and chart social studies data
- Provide access to technology at the university to that found in the elementary classroom (SMART board and Inspiration)
- A balanced distribution of old pedagogy (worksheets) and new technology strategies (inquiry).
- Sufficient time to plan for the infusion of technology into the social studies curriculum.

## Closing Comments

The findings of the study begin to document the rewards and challenges for infusing technology in field experiences. It was the first attempt at having prospective teachers in a rich technology environment for field experiences and having prospective teachers implement a social studies unit with technology. I feel this experience is the beginning of a partnership for using technology in field experiences to enhance social studies in the elementary classrooms. One prospective teacher stated: "I wanted to let you all know that this is the best field experience I have ever had in my teacher preparation."

## Conclusions

The shift in the pedagogical infusion of technology is key to the success of early field experiences in teacher education. As instructors, classroom teachers and prospective teachers make use of technology as an integral component of their daily life, we can discover new methods for infusing technology into the elementary social studies classroom. Through the technology links of early field experiences prospective teachers, classroom teachers, and elementary students can grow together, learn from each other, and develop models for infusing technology into elementary school social studies.

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# Factors That Promote and Inhibit Discourse With Preservice Teachers on a Non-Restrictive, Public Web-Based Forum

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**Abstract** This study investigated asynchronous communication factors that influence the discourse of preservice science teachers on a non-restrictive, public Web-based forum. Salient elements that promoted discourse among the participants included the level of interest in a topic, the immediate relevancy of a topic to a participant at a particular time, and interpersonal factors among participants. Limitations using asynchronous communication perceived by preservice teachers included receiving feedback too late to be of use and issues pertaining to the absence of visual cues during discourse exchanges. The linear, temporal interface of the Web-based forum appeared to be a factor that limited the depth of the discussion.

Telecommunication networks are transforming higher education. Recent developments in computer telecommunications technology have emerged as a means for providing support to beginning teachers. University teacher educators can continue to provide preservice teacher training with electronic networks when students are at remote student teaching placements. A fundamental advantage of computer networking is the flexibility it offers. Geographical and time constraints are overcome because messages can be sent at any time of the day and from any place. Electronic communication can provide a communication bridge that increases the frequency of interactions among student teachers and university personnel (Thomas, Clift, & Sugimoto, 1996). The fact that the network is available 24 hours a day is a strength only this technology can offer. In addition, combining the network with good on-site support greatly improves the quality of supervision in teacher training (Casey & Vogt, 1994).

As Web-based learning tools proliferate in higher education settings, there is a need for focused research on how such technology augments and redefines academic learning environments (Koschmann, Myers, Feltovitch, & Barrows, 1994). Since the World Wide Web is accessible to preservice teachers at home, at the university, and in their student teaching placements, it is important that research be conducted to evaluate the impact of preservice teachers' use of Web-based forums, as well as their perceptions of dialoguing with the aid of this new technology tool.

## Purpose

The purpose of this study was to investigate asynchronous communication factors that influence the discourse of preservice science teachers on a non-restrictive, public Web-based forum. The following two research questions were investigated:

1. What differences do preservice teachers perceive between Web-based asynchronous communication and face-to-face-communication?
2. How does the asynchronous Web-based medium promote or inhibit online discussion?

## Methodology

The participants in this study were composed of 32 prospective secondary school science teachers enrolled in the Professional Semester at North Carolina State University. This consisted of Methods of Teaching Science, Instructional Materials in Science, Seminar in Science Education, and Student Teaching. Twenty-one participants were female and 11 participants were male. The age of the students ranged from 21-26 years with a mean age of 22.3 years and a median age of 22. The students' initial telecommunication expertise and comfort level ranged from those with little experience and comfort using e-mail and the World Wide Web

to those who felt very comfortable and used telecommunications on a daily basis. Most students (n=23) reported that they were not confident using a Web-based forum. Only four students had some type of previous experience using a Bulletin Board System (BBS), online chat, Web-based forum, or other electronic conferencing system.

The participants had completed the majority of their academic requirements for a Bachelor of Science degree in Science Education with 10 students concentrating in biological sciences, 10 in physical science, and 12 in middle school science and math. Students were on campus daily for course instruction during the first five weeks of the semester. All high school science preservice teachers (n=20) attended the Instructional Materials in Science course for two hours per day during these five weeks. These students were divided into different Methods of Teaching Science courses based on their science concentration area. These courses were instructed by science education faculty members other than those who taught the Instructional Materials in Science course. The 12 middle school preservice teachers were instructed in separate instructional materials and methods courses than the high school preservice teachers.

Students were on campus daily for course instruction during the first five weeks of the semester. For the following ten weeks, each student was assigned to a public school in a school district near the university for a student teacher internship.

## Context

In order to examine the potential benefits of preservice science teachers engaging in an electronic professional community of science teachers on the World Wide Web, a public Web-based forum called the SciTeach Forum (http://www.ncsu.edu/sciteach) was constructed in July 1997. The SciTeach Forum was placed in the context of a large public science education Web site. The SciTeach Forum serves as an online support network for both inservice and preservice science educators.

The SciTeach Forum was designed to be a place where science teachers share ideas, reflections, and conversations on teaching and implementation of technology in the classroom and other instructional pedagogy, while also providing support for each other as members of an electronic professional community. The SciTeach Forum was designed with NetForum software. NetForum is a Web based group communication and collaboration system provided by the University of Wisconsin Biomedical Computing Group. The program is written in Perl and works on any UNIX-based system with Perl 4.0.1.8 or later that supports CGI subdirectories. Forums are organized into discussion topics and messages. A simple, intuitive toolbar allows user access to NetForum features. Forums can be created and managed by "forum owners" with the administrative tools via the World Wide Web. Forum topics and messages can also be edited via the administrative tools. Forum owners can customize many of a forum's features and can add html codes into the headers and footers of each of the forum's web pages.

The NetForum software was selected to create the SciTeach Forum because it was available at no monetary cost since our institution has a site license to use the software. Another reason to use the NetForum software for this project is ease of use. In addition, the software allows the users to initially structure the discussion topics on the forum in any order. The software also enables any user to add a new discussion topic to the forum. Within each topic area, a user can post a new message, reply to a message, or reply to a reply of a message. When users first enter a topic area, they are presented with a list of message and reply titles. Each message and reply title displays the author of the message and the date the message was posted on to the forum. Message threads are displayed in a temporal sequence with the most recent message listed at the top of the screen. Each message and reply title is a hypertext link. The user clicks on a message or reply title to view the posted message. The software also enables the user to read an entire thread of successive replies to the original message.

The SciTeach Forum can be accessed by anyone with a connection to the World Wide Web. A special e-mail account or password is not a requirement to read forum messages or post messages to the forum. Unlike other previous studies involving preservice teachers using telecommunications during their student teaching semester, there was no additional funding to equip the preservice science teachers with laptop computers and telephone modems (Bull, Harris, Lloyd, and Short, 1989; Casey, 1994; Loiselle, Dupuy-Walker, Gingras, and Gagnon, 1996; Merseth, 1991; Schlagal, Trathen, and Blanton, 1996; Thomas et al., 1996; Thompson and Hamilton, 1991; Waugh, 1996; White, 1997; Zimmerman and Greene, 1998). We assumed that at least one computer in the school where a student teacher would be placed during the student teaching internship would have online access to the World Wide Web. Each school did have access to a networked computer. However, eight students were unable to access that computer during their internships.

The SciTeach Forum contains discussion topics relating to teaching science content, incorporating instructional technology into the curriculum, and topics relating to teaching pedagogy in general.

The preservice high school science teachers were introduced to the SciTeach Forum during the first on-campus day of their Instructional Materials in Science course during the Fall 1998 semester. The preservice middle school science and math teachers were introduced to the SciTeach Forum during the fourth on-campus day of their Methods in Science and Math course. Each student was instructed how to use the SciTeach forum in class and required to post a message on the forum to introduce themselves in the "Preservice Science Teachers" discussion topic area. As part of the required course work, each student was required to post two messages to the SciTeach Forum for the entire semester each week. Of these two postings, one posting each week was required to be placed into the "Critical Incidents in the Science Classroom" topic. Critical incidents are defined as an event which confronts teachers and makes them decide on a course of action which involves some kind of explanation of the scientific enterprise (Nott & Wellington, 1995). The following is an example of a critical incident:

*You are doing another inquiry lab. As you walk around the room you notice several students off task. You move more closely to observe them and to get them back on task. A student says to you, "This is dumb! You could just simply tell us the answer and how to do the lab. We'd learn the material more quickly and get to new things." What kinds of things would you say and do at this point?*

The majority of the instructor-posted critical incidents placed on the forum adhered to Nott and Wellington's definition. A few of the critical incidents posted involved non-specific science pedagogy issues that could apply to any preservice teacher. These included issues such as covering all course objectives for the "end of the -teacher/cooperating teacher relationship.

The preservice teachers, four science education faculty members, six science education graduate students, and eight persons unassociated with the university participated in the forum discourse during the semester. The forum was monitored regularly by two university instructors of the Instructional Materials in Science course. At the beginning of the semester, an invitation was circulated to each science education faculty member and selected graduate students to participate in the forum discourse. An e-mail list was established to notify participating faculty members and graduate students of forum messages posted by the preservice teachers pertaining to specific concerns of their internships.

## Data Collection

A survey was administered to each subject at the end of their student teaching semester. The survey consisted of open-ended questions, Likert-type attitudinal questions, and multiple choice type questions designed to identify the preservice science teachers' perceptions and attitudes regarding their experience interacting with a Web-based forum during their student teaching internship.

Nine interviews were conducted from a stratified random sample of preservice science teachers. Preservice teachers were stratified based on their methods course. Three subjects were interviewed from each of the 3 different methods courses. The interviews addressed the participant's experience, attitude, and perceptions with using the Web-based forum during the 5 weeks of on-campus course work and during their student teaching internship. Three interviews were conducted during the second week of the participants' student teaching internship and six interviews were conducted during the week following the end of the participants' student teaching internships. Interviews were recorded using audio tape and then transcribed by the researcher.

## Findings and Discussion

### Promoting Discussion

An assortment of factors appeared to promote discourse among the participants. The level of interest in a topic appears to be an essential factor in promoting discussion. The immediate relevancy of a topic to a participant at a particular time is also an influential element to the depth of the dialogue. Furthermore, interpersonal factors among participants were salient elements in promoting discourse. The participants were a group of preservice teachers experiencing similar situations during their student teaching internships. As the participants encountered similar classroom management and discipline problems, they used the forum to share and discuss their related situations.

Discussion of controversial topics also increased the depth of the forum dialogue. As one interview participant stated,

"When you get fired up about something and you're really interested and passionate in an idea, I think you are going to talk about it more than if you just feel so-so about it. If you're not real sure how you feel then you are not going to respond as much. But if you know what you're thinking, then you're going to talk a lot more.

On the forum, participants expressed their personal opinions and views in discussions involving ethical issues. Throughout the discourse and in the participants' interviews, several critical incidents in science teaching were referred to as "touchy" or controversial issues. These participants perceived discussing controversial issues as getting them "fired up". Furthermore, they were interested in hearing what their peers thought or how they would react to a given situation. In the discourse, participants explained and defended their moral positions and beliefs. Some participants also said they were more willing to contribute to the discussion of sensitive issues than to other topics.

The forum promoted discussion by allowing one access to others' perspectives. It allowed for different opinions to be analyzed and agreed with or argued against. For students who were isolated in their student teaching placements, the forum promoted discussion just by being there. The forum provided a place where isolated student teachers could share and discuss their teaching experiences.

**Inhibiting Discussion**

The interface of the Web-based forum appeared to be a factor that limited the depth of discussion on the forum. Replies to posted messages are organized temporally with the newest reply at the bottom of the message thread. This mirrors the organization of a bulletin board system. Users could also read an entire thread of successive replies to an initial message. In this manner, an entire thread resembled a face-to-face conversation. However, the nature of communicating asynchronously in a temporal, linear manner was sometimes perceived as restricting the discourse. An interviewed participant stated:

"It's not an immediate dialogue. Its put a question up there or a problem up there and somebody replies back and you read it whenever you get to a computer. It's not a constant dialogue. It's not back and forth, back and forth, back and forth. It's a posting, then a reply. That's it. Because it's not immediate, you can't really challenge it or ask more questions or ask to go into further detail. Not the way it was set up. I guess you could e-mail that person and ask them. But as far as the forum went, it wasn't set up

The nature of asynchronous communication does not promote an immediate back-and-forth dialogue that is often required by a person to get the specific type of feedback one is looking for. When one engages in face-to-face conversation, the nature of the communication is often a continuous process. The forum interface does promote a reply, but not a "back and forth, back and forth" discussion. A natural flow of conversation is not easily achieved when participants access the forum on a weekly basis. Participants viewed the forum's linear structure as impeding the flexibility of the communication because they could not place their replies directly to specific messages in a thread.

A large number of participants responding to the same critical incident appeared to cause a saturation effect in the discourse. In many of the message threads, after half of the students responded, the responses began to "sound along the same lines". One participant shared her insight to this phenomenon:

"I think people will wait to see other people respond to it. And then pull their responses up on the screen and be like okay, this look good. I'll type that down as well. Versus sitting down and really thinking about the incident and being like, well, this is the way that I would handle it, let me see someone else's view, but this is the way I'm going to handle it. Versus comparing and contrasting, they'll just take the easy route out and write just what someone else has or type out what someone else has."

Some participants read the postings of others and then contributed to the dialogue by restating previous ideas by adding "a new twist" to the discourse. In some cases, the participants responded to a critical incident without reading the responses of others. However, this was not the case for all participant postings in the latter stages of the thread. There were students who often posted toward the end of a message thread with a reflective posting that built on the ideas of others. In order to reduce this saturation effect, one might want to consider reducing the number of participants responding to a critical incident, or have a group of students adopt different thinking-related roles in their response to the discourse generated in a critical incident thread. These roles could include a "devil's advocate", speculator, brainstormer, optimist, pessimist, or judge. Even though we structured critical incidents with dialogue prompts to intentionally promote discussion of science-specific pedagogy, it appears that more structure is required in order to facilitate large group discussions on the Web.

## Conclusions

The findings in this study illustrate a variety of factors that influenced the discourse of preservice science teachers using an asynchronous, non-restrictive public Web-based forum. The asynchronous nature of the Web-based forum allows preservice teachers to communicate in a reflective online community at their convenience. Many of the message threads that occurred on the forum were topics that were not part of the preservice teachers' in-class instruction. The forum offered new opportunities for participants to discuss and reflect on classroom issues that were directly relevant to their student teaching experiences. Our findings also revealed there are some constraints and limitations with using asynchronous communication with preservice teachers. These include receiving feedback too late to be of use and issues pertaining to the absence of visual cues during discourse exchanges. Moreover, if we expect preservice teachers to use telecommunications tools to engage in reflective communities of practice, then it is important that time is provided in their daily routine to use these tools to reflect on their practice.

The conventional rules of communication change in the online medium. Non-facial communication issues are intrinsic to this situation. Communication exchange is not guaranteed among all participants since participants can chose selectively which postings to read or not to read. Most participants (n=28) stated that they read messages posted on the forum by scanning the content for issues of interest, while disregarding messages or skimming others. One participant stated that he usually skimmed through messages and read only those posted by peers from his methods class. Furthermore, the comfort level with the Web-based medium itself might be a factor to how students communicate with each other. In Web-based communication, there are no personal nuances such as facial expressions or hand gestures, which accompany the dialogue. Since the forum provides a means to communicate asynchronously, it permits the more timid and reflective learners in a group a chance to participate in the discussion more than they might in a face-to-face conversation. The structure of the forum also enables each participant the opportunity to have time to reflect on what has been said, think critically, and then respond.

With many asynchronous conferencing software packages available to more research needs to be conducted to determine the most appropriate design structure to use with a public, non-restrictive asynchronous Web-based forum. Ease of use with respect to the design structure is an important factor to consider. Most asynchronous conferencing software packages use either a linear or hierarchical tree structure. Linear structures add a reply in a temporal manner to the end of a linear chain of messages. A hierarchical tree structure allows a user to attach a response directly to any message. This allows a discussion to potentially branch out infinitely. The linear structure is simpler to navigate and more closely resembles a face-to-face conversation. However, some of our participants felt frustrated with the lack of flexibility in the linear structure and wished the forum provided a hierarchical tree structure. Although we view the linear structure as easier to navigate, some participants still experienced difficulty locating older messages threads on the SciTeach Forum.

Conferencing in delayed-time versus real-time with preservice teachers placed in remote geographical internships remains an issue to be further explored. A disadvantage some participants perceived with using asynchronous communication was that they did not receive immediate feedback to problems they were experiencing in their classrooms. This situation exists because immediate feedback can only be provided if the participants of the Web-based community read and respond to each new forum posting on a daily basis and are provided with easy access to the network. Using synchronous communication with preservice teachers could provide for immediate feedback to problems and concerns they experience in their classrooms. Furthermore, a synchronous environment would enable participants to participate in a dialogue which more resembles a face-to-face interaction. We believe that the logistics of coordinating synchronous communication with our participants would have been extremely difficult given the resources in their school placements and their schedules. Unless provisions could be made to ensure each participant has access to a networked computer and busy schedules could be coordinated, engaging preservice teachers in synchronous communication would not be feasible.

We have just embarked on a journey to understand how preservice teachers use asynchronous communications in a public, non-restrictive Web-based forum. We are learning how the structure of a Web-based medium promotes learning in a social context. As higher education continues to integrate Web-based tools into teaching pedagogy, it is important that we continue to analyze and research the mechanisms that facilitate learning online. Given our results, we plan to continue to use public, non-restrictive Web-based forums with our preservice science teachers. In the forthcoming semester, we will include another cohort of preservice science teachers from a different university to actively participate in the forum. We plan to have groups of students adopt different thinking-related roles in their response to the discourse generated in the

critical incident in science teaching threads. These roles will include a "devil's advocate," speculator, brainstormer, optimist, pessimist, and judge. We will also post four different critical incidents in science teaching each week to the forum instead of one per week to see if this reduces the saturation effect that appeared in the discourse during this study. As a result of this research, we are continuing to understand how preservice science teachers communicate with their peers and instructors from remote locations using the World Wide Web to develop into a community network of practice.

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# Impact of Asynchronous Discussion on a Preservice Teacher Education Practicum Experience

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**Abstract:** Teacher education programs have long recognized that in order to develop their pedagogical capacity, pre-service teachers must have teaching experiences and interactions with students during their program of preparation. At the University of Minnesota we implemented the use of web-based asynchronous discussion areas to increase the quality and quantity of English education initial licensure program students' interactions with middle school students during a practicum experience. We describe here the necessary coordination and communication among methods and technology course faculty, technical support personnel, and the cooperating middle school teacher in identifying and implementing this technological support to a collaborative project. We also describe the preservice teachers' positive and negative impressions of this mode of communication.

## Introduction

Teacher education programs have long recognized that in order to develop their pedagogical capacity, pre-service teachers must have teaching experiences and interactions with students during their program of preparation. This fall the English Education licensure program at the University of Minnesota implemented the use of web-based asynchronous discussion areas to increase the quality and quantity of pre-service teacher and student interactions during a practicum experience.

The use of these discussion areas is part of a larger effort in our College of Education and Human Development to integrate technology into our teaching methods courses. Through our Ed-U-Tech project, a Preparing Tomorrow's Teachers to Use Technology (PT3) grant from the U.S. Department of Education, faculty in fifteen content areas in which we license teachers are learning about educational technology and creating teaching materials to support its integration. The methods instructors and technology course instructor are working together to successfully model the integration of technology. These efforts provide opportunities for pre-service teachers to use technology as an instructional tool and receive feedback on those efforts.

## Telementoring through Asynchronous Discussion Boards

As part of the reading and writing methods courses, the English education cohort (34 post-baccalaureate students) had a practicum in a middle school centered on a co-inquiry project that required the college and K12 students to write together in multiple genres. Each pre-service teacher was teamed with four students with whom they discussed the topic of their inquiry, relevant sources of information on it, the revision of their writing products, and generally just got to know one another. But, communication was a challenge because our pre-service teachers couldn't always be at the school during the English class period of their assigned students. We needed a mode of communication that could support our pre-service teachers' interactions with students. We turned to web-based discussion areas for our solution, a method the Ed-U-Tech project had already successfully used as a part of our project's outreach efforts.

## Technical Contexts of K-12 Public Schools and Universities

When deciding the method of communication, the technical contexts of both the K12 public school and the university were taken into account. All of the preservice teachers had email accounts, but because of privacy issues and the school's Internet use policy, students in the middle school weren't allowed to use email at school. In addition to preparing for the cooperation with the methods and foundation's technology course at the university, even if the

use of an email account was acceptable, the cooperating teacher would have had to work on setting up individual emails for each middle school student adding an additional burden.

Efficient use of time was an important factor when deciding the use of the technology. The middle school students only met with the preservice teachers twice a week. They needed more frequent and in-depth communication in order to complete an entire multimedia project. The asynchronous discussion boards would allow the middle school students and preservice teachers to post and/or answer questions when they had time, whether in class or at home.

Supervision of the exchanges was also considered in the selection of this communication method. This project was new for the methods instructors, cooperating teacher, preservice teachers and middle school students. Therefore, the ability to oversee and reflect on the communication that was taking place was very important. The asynchronous discussion board allowed all people involved in the project to simply go to the web site and view the conversations that were taking place between the preservice teachers and the middle school students.

## The Benefits and Drawback of Asynchronous Discussion

We sent an email to all 34 pre-service teachers who participated in this project. Twenty-five of the 34 students responded to the following three questions: a) How did the ability to post and receive messages via the Internet impact the learning and/or teaching process with your middle school students?; b) How did the ability to post and receive messages via the Internet impact the mentoring process with your middle school students?; and c) How did the communication between you and the crosswinds students enhance your final multi-genre project? We grouped similar comments and then categorized them as generally positive or negative

Benefits

The benefits of this activity were: a) the students were able to get to know their cooperating preservice teacher much better before and during the project; b) the students and preservice teachers were able to share the content of their final project with each other on a regular basis; and c) the preservice teachers and the middle school students have become more confident in their use of technology.

After a one-time face-to-face meeting they began to communicate with one another online. The middle school students were able to ask general questions of the preservice teacher with whom they would be working the entire semester. This also gave the preservice teacher the same opportunity to get to know the middle school student better and their interests, which was important as their first task was to determine the theme of their project. A preservice teacher commented that the middle school students were "at more ease asking questions and obviously weren't so nervous" as they had been when they met each other in person. He commented that the students would ask questions about "how old we were and why we were deciding to become a teacher."

The ability to have and maintain a mentor-student relationship was also very valuable. A preservice teacher said, "using the Internet site with my students was a great way to maintain a mentor-student relationship. When students were allowed access time to the web site, I received a number of messages from all of my students

The preservice teacher and K12 students readily shared the content of the multi-genre project throughout the semester. Most beneficial was the ease with which they could share relevant web sites, ask questions, and receive responses at any time throughout the semester. A preservice teacher commented that "it was extremely helpful to be able to send students URL sites on the web that would help them to locate information about the person we had chosen to do our report on for the multi-genre project. Then students could easily access these sites by just clicking on the address. This eliminated a great deal of unnecessary confusion."

The asynchronous discussion web site greatly eased the process writing the bibliography for the final project. All the sites the preservice teachers and middle school students had previously visited were already stored on the asynchronous web site, so they could easily write down the author, title, URL and other information necessary for completing the final project.

All of the preservice teachers questioned about the project experience, including the use of the asynchronous discussion board, felt it helped them to increase their overall technology ability A few who resisted this mode of communication at the beginning commented that they found how much of an asset it was to use with their students and therefore were motivated to use it. They also commented that the both they and the middle school students "were actually able to see how communication over the Internet could be of value to the classroom."

"Drawback"

Only one drawback resonated throughout the experience: computer access for the middle school students. The preservice teachers wished that the students could have had daily computer lab time to check the discussion

board and reply or post as necessary. The preservice teachers commented that the "majority" of the students did not have access at home and relied completely on the school for access. The preservice teachers identified this as the only real drawback of the entire collaborative, technology-enhanced project. As one preservice teacher commented, "The potential was amazing, the reality disappointing. Students simply didn't have enough time in the computer labs to respond."

## Conclusion

This multi-genre writing, multimedia, co-inquiry project produced successful end products. The middle school students gained experience in writing in a variety of genres, communicating through multiple media, and using education technology to do so. Likewise, the pre-service teachers developed their skills in these same areas. More importantly for our pre-service teachers they gained teaching experience and had a chance to interact with students while in the role of the teacher. This mode of telecommunication facilitated increased social and substantive interactions between the middle school students and the pre-service teachers from the beginning to the end of the project. We caution that computer access on both sides of the partnership is key to communication via asynchronous discussion. Once that is overcome, as this paper reports the potential benefits are many. With successful planning and implementation, asynchronous communication can be a successful tool for increasing the quality and quantity of preservice teachers' interactions with K12 students during a practicum experience.

# Regional List Servers as a Means of Peer Support for an On-Line Learning Community

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**Abstract:** This paper describes an on-going experience of using regional list servers to provide peer support to an on-line learning community of 248 students already using an electronic forum to study by distance. A regional list server is a list server providing peer support to students in a specific geographic region. Fifteen list servers were used for the course.

List servers with a large number of students have the problem that if even a small number post messages the list participants have too many messages to digest. Students have commented that they prefer to work in smaller groups. Regional list servers provide students with a more intimate experience and reduced message load. The underlying principles are discussed and an explanation is given of how the interactions on the 15 list servers are stimulated and monitored.

## Introduction

The creation of a community spirit is an essential prerequisite for success when using an electronic forum (Hiltz 1998) (Anderson 1998). Without this feeling of camaraderie people feel inhibited from posting for fear of looking foolish, or from responding to postings for fear of being branded a "tall poppy" or know-it-all. Speaking up in small class or posting in a small electronic communication space seems much easier because the participants develop relationships and trust with the others in the class. In previous work with an electronic forum (Green & Eves 2000) students commented that smaller workgroups would allow them to get to know the others with whom they were working. In an effort to provide this more intimate space, several regional list servers based on the regions of New Zealand were created. It was hoped that the relationships and the peer support network that developed would increase the rate of participation in the Delphi forum (Delphi), our virtual classroom. We were also interested to see how students would respond to the increasingly varied means of student-student communication at their disposal. A major benefit envisaged was that the smaller population would reduce the information overload that can occur in list servers with larger populations.

The Open Polytechnic of New Zealand is the largest provider of open and distance education in New Zealand. The majority of teaching is done by distance. The students described in this paper were studying a Computer Concepts paper that is a compulsory part of the National Diploma in Business course and approximately equivalent to first year degree level. Most students are adults in their late 20's to early thirties approximately two-thirds female and mainly Pakeha (non-Maori). The Maori were the first people to settle in New Zealand, those not of Maori descent are termed Pakeha. The majority of students on the course had little experience of using a computer for anything more than word processing. A small number used e-mail regularly. Very few had experience of using Internet forums, list servers or on-line chats.

## Method

The postings of students were monitored over a period of 17 weeks. The list server chosen was Listbot (Listbot). Listbot is a free service provided by Microsoft on the Internet. The site allows the creation of list servers for either announcements (one to many) or discussion (many to many). There appears to be no limit on the number of lists that an owner can operate. The on-line creation of a fully working list server takes less than five minutes which includes selecting any information that you wish the list server to gather on registration. Each list server gathers demographic information when the student subscribes as requested by the list owner. Thirteen list servers were set up based on the New Zealand regions. Two list servers based on ethnicity/language were set up with the intention of supporting those students whose second language is English in the believe that they could get additional peer support in their first language. These list servers supported Maori and Chinese students.

Students are not spread evenly across New Zealand but tend to be concentrated in the main population centres two thirds of which are in the North Island. The mountainous South Island, often called the Mainland has less than 1 million people. It was estimated that a group of around 5 students would be able to form a viable and cohesive group. During the first two weeks of the course it was essential to support single students and encourage them to subscribe to one neighbouring list server if students numbers were low in their area. This also increases the cross fertilisation of the groups without destroying the intimate sense of the space.

## Marketing the list servers

The regional list servers were marketed in our electronic forum (Delphi) and by mail before the start of the course. In addition whenever communicating with students by phone, fax, e-mail, or during weekly on-line chat sessions on the forum, students were reminded of the importance of using their regional list server. The functions of the various means of communication were described to the students as follows in order to help them understand how to use the various tools:

"The forum is our electronic classroom; it is necessarily formal and tightly controlled. It is your place to ask questions, to get guidance how to get started on a particular activity in the course and the place to find and receive answers. It is your frequently asked questions resource. It is not a place to have personal conversations."

"The on-line chat is your student common room, bar or seminar room, it is informal and uncontrolled. It is the place to meet up and talk about the course, what's on TV, to gain motivation and direction, and generally get to know your classmates. Brief personal conversations are acceptable but remember it's one-to-many, so try and follow the threads of the conversations that will be fast and furious!"

"The regional list servers are like inviting people into your home to study with you. It's quick, simple, informal and direct. The e-mail you will receive will be from an individual, but everyone on the list will receive the same e-mail. It's the equivalent of a small study group without the hassles of having to travel. People on your list server may be your close or distant neighbours, we encourage you to also use it to arrange social events and form study groups."

## Monitoring the List Servers

The list owner is automatically subscribed to each list server. This could potentially result in information overload for the tutor even though the tutor role in a peer support network is more for policing than for interaction. In order to control the flow of e-mail, a series of rules were set up in the tutor's e-mail client, Outlook 2000, to direct the mail to a series of folders, each named after the respective list server. To ease tutor communication with the list servers a personal distribution list was also created. This provided the students with a small intimate view of their list server, whereas the tutor had an overview of the activities taking place in every list server. The tutor could address the whole class, a regional group, or an individual. It was considered important that the data for this study was gathered automatically to enable the tutor to concentrate on the tasks

of motivating and directing the students in the forum. A weekly e-mail report from each list server informed the tutor who has subscribed or if anyone had unsubscribed. E-mail from the groups was archived both on the tutor's computer and in the archives of the list servers.

## Results

We selected four regional list servers out of the 15 to analyse. The two largest urban list servers based on the Auckland and Wellington regions contained 23 and 31 students respectively. The two rural list servers selected were based on the Bay of Plenty and Waikato regions and contained 7 and 9 students respectively. It should be noted that although well promoted the two list servers set up to allow ethnic students to discuss ideas in their own language were barely used. Both Maori and Chinese students participated fully in the regional list servers and ignored the option of using their own language even with the opportunity of support by a Chinese-speaking staff member.

**Some questions**

***1. Do students have preferred learning partners with whom they communicate on a regular basis?***

Students were asked to identify themselves by posting an introduction to the list server in the first few weeks of the course. In larger list servers students had more potential partners than in smaller list servers. However the data below shows that in larger list servers more than 50% of students select just two partners with whom to discuss issues with. In smaller list servers most students make contact all the other students. Students either posted messages to everyone (shown as 'All' below) or addressed the message to a specific individual. The number of messages posted to their first and subsequent partners were summed and expressed as a percentage of the total number of subscribed students. The percentages shown would have been higher if expressed as a percentage of the active students. People talk to more people in smaller list servers than in larger list servers.

| List Server | Number of students subscribed | Number of active students | Number of students posting to All (Average number of messages) | % with 1 partner (Average messages) | % with 2 partners | % with 3 partners | % with 4 partners | % with 5 partners |
|---|---|---|---|---|---|---|---|---|
| Auckland | 23 | 20 | 19 (3.47) | 60.9 (2.21) | 52.2 (2.42) | 26.1 (2.00) | 26.1 (1.5) | 21.7 (1.4) |
| Wellington | 31 | 22 | 19 (3.9) | 54.8 (2.24) | 38.7 (1.17) | 25.8 (1.38) | 16.1 (2.0) | 12.9 (1.0) |
| Bay of Plenty | 7 | 7 | 7 (8.29) | 85.7 (2.17) | 85.7 (2.0) | 85.7 (1.5) | 28.6 (1.5) | 28.6 (1.5) |
| Waikato | 9 | 7 | 7 (13.43) | 77.8 (4.86) | 66.7 (5.67) | 66.7 (5.0) | 66.7 (5.0) | 44.4 (5.0) |

**Figure 1 – A comparison of the rates of posting and the number of partners in large and small list server populations**

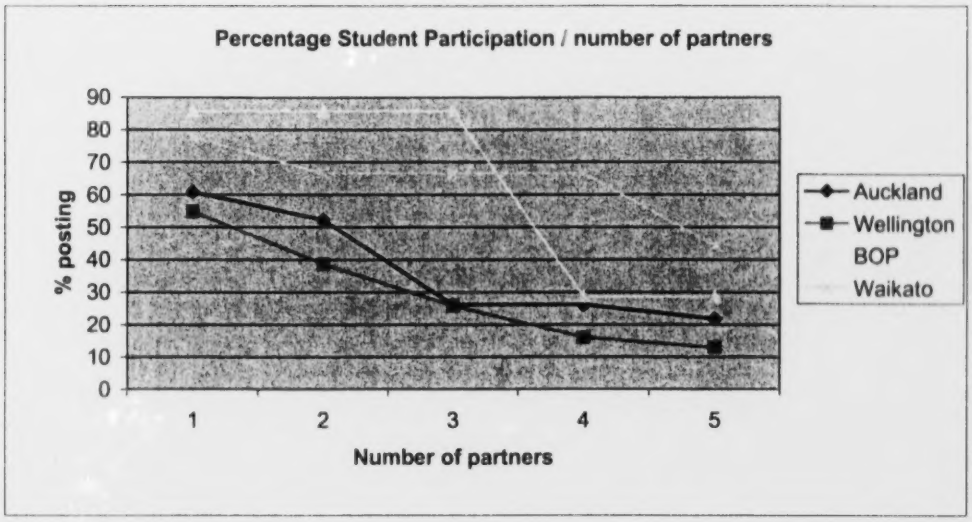


**Figure 2 – A graph of the percentage of students posting against the number of partners**

*2. Do larger populations produce more postings per capita than smaller populations?*

It might be expected that the number of interactions would be greater in a larger population due to the greater range of opinions and personalities. This does not appear to be the case. The Bay of Plenty and Waikato list servers received 127 and 287 postings respectively from an active student body of just 7 students each. Auckland and Wellington received only 215 and 202 from 20 and 22 active students respectively. Waikato students posted an average of 41 messages each, compared with Auckland's average of just 10.

*3. Is there an optimum size for a list server population?*

When size of list server population is graphed against the average per capita posting for each list server over the period of study, a peak is seen around 9 participants. It is suggested that this optimum figure could rise if a group functions for a longer period of time and more people come to recognise each other as individuals. Self disclosure, the divulging of personal information, is a key element in raising the level of participation. Those individuals who expressed themselves more fully had more contacts and a greater number of partners than those who merely asked for and exchanged information.

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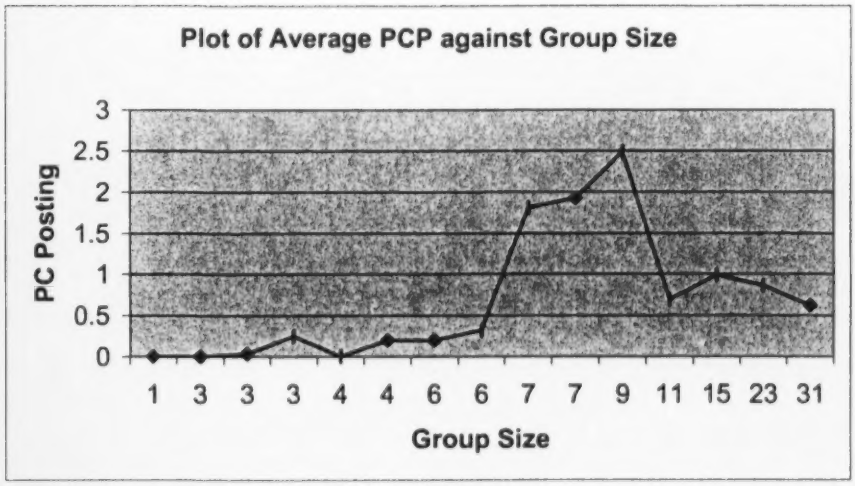


**Figure 3 - Graph of the average per capita posting against the list server population size, over the period of study**

***4. Is there a difference in use of the list servers in urban and rural areas?***

In the Wellington central business district, which is compact compared to the sprawling Auckland central business district, the list servers were used to arrange face to face study groups which met at weekends and during lunchtimes. This was entirely due to the response of one individual to a tutor suggestion. The posting rates described above was measured before these groups formed and do not account for the differences in posting. No organised groups formed in Auckland though some students did pair up occasionally. The data shows that the regional list servers were used much more in the rural areas, probably due to the distances between students.

***5. Is there a relationship between the number of messages a student posts and their success on the course?***

Certainly most successful students are students with postings in the high 30's, however several low posters also obtained good results in the assessment and several high posters received lower scores. It is not possible to ignore the fact that everyone received the messages whether they actively participated or not. There is no obvious relationship between posting rate and success on the course.

***6. Does increased peer support result in success for all on the list server?***

There was no clear difference in the percentage of students on the list servers achieving A+, A or C grades and those who chose not to be on the list servers. A larger sample of students may show that those with an intermediate skill level of B+ or B may improve their achievement by interaction with and observation of higher scoring students.

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7. ***Does increased peer support result in increased retentions?***

There was no apparent difference between the retention rates of the trimester with added peer support by list server and the previous one without this support. Loss of students is almost always due to personal problems with work or home life rather than any course related issues.

## Conclusion

The main conclusions of this study are as follows:

1) Students post more messages per capita in list servers with smaller populations.
2) The optimum size of a list server population in terms of the number of postings per student appears to be 9.
3) Students in list servers with small populations had more partners with whom they corresponded regularly than list servers with large populations.
4) Most students had only two regular partners in a list server with around 20 active posters.
5) There were insufficient numbers to determine if there was a relationship between being in the list server and success on the course.
6) Retention rate was not affected by having peer support.
7) Posting rate is an unreliable indicator of future success on the course.
8) Receiving peer support does not appear to influence the percentage of students achieving grades A+, A or C but it is felt that a further study may demonstrate that intermediate students may benefit from interaction with higher scoring students.

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# Going the Distance:
# Developing Guidelines for the Creation of Online Courses

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**Abstract**: This paper reports preliminary findings of a study assessing the quality of existing online courses at five Internet sites including three university institutions, and two commercial sites that provide software packages for educational online course development. This study was performed in two graduate-level information technology in education courses. Findings indicated that, overall, students were dissatisfied with the quality of online courses available. In fact, this study indicated that many of the purported online courses were merely traditional course syllabi placed online, or traditional correspondence courses where the study materials are obtained online. Suggested guidelines for the development of an online course include: a comprehensive description of the course, including purpose and objectives; time required to complete the course; tuition costs; grading policy; accreditation/degree fulfillment; prerequisites, including technology skills; minimum system requirements; and testimonials. Also important is inclusion of a brief demonstration of a course module for student evaluation prior to registration.

## Introduction

Educational headlines today proclaim both the successes and failures of using technology and the World Wide Web in the form of online courses for distance education. Indeed, there are many advantages and disadvantages to the escalating wave of online courses offered through the World Wide Web. Strong supporters of online instruction cite positive effects such as ease of accessibility to students in rural areas, students with disabilities, and students with busy work schedules. Those who question the use of online instruction cite increases in student attrition rates, tuition costs, and time management requirements. However, these stances are meaningless unless online courses are developed using standard criteria that ensure a quality product (Harris, 2000). Although there are no ideal rules that encompass every situation (Carr-Chellman & Duchastel, 2000), basic guidelines should be developed and implemented (Madden, 1999). These basic guidelines will assist instructors in the development of their own online courses. For the purpose of this paper, distance education via online instruction was defined as the ability to complete course work through the use of a personal computer only. That is, the student would never have to attend classes in a traditional classroom setting for lectures or exams, and would have the capability to interact with the instructor and fellow classmates via the computer. We acknowledge that other valid combinations of distance education exist that include various combinations of traditional classroom activities enhanced or supplemented by Internet resources, but for our purposes we identify those as Web-enhanced instruction as opposed to online instruction. Material for traditional correspondence courses may be placed online, but if they do not include interaction between the instructor and the student, or among students, we also identify them as Web-enhanced instruction. The purpose of this paper is to present suggested guidelines for developing an online course.

## The Study

Web sites promoting distance education instruction via online courses were selected for evaluation during the fall semester 2000. Twenty-five graduate students enrolled in information technology in education courses evaluated 125 online courses located at five different Web sites. A six-point Likert scale (*Very Strongly Disagree; Strongly Disagree; Disagree; Agree; Strongly Agree; Very Strongly Agree*) was used to rate the following ten categories:

1. General appeal (Web page design, ease of use, clear instructions)
2. Quality (overall assessment)
3. Online and offline activities (bulletin board discussion, video presentations, readings)
4. Interactivity (ability to interact with instructor and/or classmates)
5. Asynchronicity (chat room, real-time discussion groups)
6. Accreditation (credit toward degree, licensure, certificate)
7. Advantages over traditional classroom
8. Advantages over traditional correspondence course
9. Potential (degree to which this site would successfully qualify as an online course)
10. Technical problems (navigation, ease of use, time spent, system requirements)

Students were encouraged to evaluate subjects of interest to them. Subjects varied across the spectrum from Introductory Statistics to Japanese. Students also recorded the amount of time they spent attempting to retrieve basic information about each online course evaluated, and noted any technical difficulties.

**Results**

An analysis of these evaluations showed that of the five Web sites evaluated, three received an overall rating of 3 (*Disagree*) on the six-point Likert-scale, and the remaining two received an overall rating of 4 (*Agree*). The students spent an average of 45 minutes per course to evaluate the ten categories listed. They expressed disappointment that many of the purported online courses were simply traditional course syllabi placed online, or traditional correspondence courses where the study materials are obtained online. In fact, for many of the online courses, students were still required to attend class on campus. Another common issue students reported was the inability to preview the course, and for many courses, even a syllabus before registration. They noted that when considering a course on campus, most would investigate the merits of both the course and instructor through peer discussion before committing the time and money. However, there was little opportunity for students to do so for most online courses.

**Conclusion**

Suggested guidelines for the development of an online course include: a comprehensive description of the course, including purpose and objectives; time required to complete the course; tuition costs; grading policy; accreditation/degree fulfillment; prerequisites, including technology skills; minimum system requirements; and testimonials. Also important is the inclusion of a brief demonstration of a course module for student evaluation prior to registration. This should demonstrate the integration of course materials and instruction with the student's technology capabilities. Distance education is an important component of our society today. It is hoped that these preliminary findings will further the research associated with the advancement of standardized guidelines in the development of online courses for distance education, and thereby benefit student, instructor, and institution.

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# Umm…I Don't Think it's Working: Why our Class-to-Class E-mail Exchange Didn't Work (and What can be Done to Fix it)

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**Abstract**: Last spring, my teacher education students and I decided to partner with a local middle school via the Internet. Since my college students were in the process of learning how to be English teachers, and the middle school students needed help with their writing, the match seemed to be perfect and beneficial to both parties. However, the technology, rather than being an invisible vehicle for communication, got in the way. The middle school teacher and I, try as we might, had many difficulties with not only scheduling, but also utilizing the technology itself. While we still feel that our project was worthwhile, there are many changes that we will make before attempting another e-mail project in the future. This paper addresses those changes.

## Introduction

I knew that we were in trouble from day one. For the past few weeks, Linda and I had been discussing connecting our two classes via the Internet. My undergraduate pre-English education students were to act as a "real" audience to critique her eighth-grader's creative writing. In theory, it was a wonderful idea. Much research has indicated that providing an authentic audience for students can help to raise not only their level of motivation for writing tasks, but their technical skill as well (Hawisher, 1992; Citrino & Gentry, 1999). The Internet, and e-mail in particular, provided the perfect medium for transferring large amounts of text in a timely fashion, much faster than relying on old-fashioned "snail mail." Plus, Linda's students were eager to use the computer to type and send their stories. At the same time, my undergraduates were eager to get their hands on "real" student writing, the kinds of writing to which they were training to devote their professional careers.

## The Initial Project Goals

The students registered in my Introduction to English Education course last spring came to me with varying undergraduate backgrounds, but all hoped to apply to the following year's Master of Education program in English. All were eager to get their hands on "real" student writing. It was one thing, we agreed, to read about helping students to become better writers, but quite another to actually put our words and thoughts to action. My students were aware that technology in the secondary school classroom is here to stay, and most had little to no experience in how to integrate that technology successfully into the existing curriculum. By engaging in this project, my students would see how Linda, a classroom teacher, would use technology to connect to them, pre-English education majors, for mutual gain. The goals for my students were simple: once their middle school partner sent them a piece of writing, they were to read it carefully and offer praise for what was done well and suggestions for improving what still needed work. They were told to look not only for the obvious, surface-level errors with punctuation and spelling, but also ways to improve the overall tone or feel of the piece. Once comments had been made, an e-mail containing the middle school student's writing and the college student's response was sent via attachment to Linda's account. We decided that there needed to be a bottleneck at some point to

monitor what was being sent back and forth to avoid any inappropriate comments from taking place. Also, to insure anonymity, student initials were used in lieu of full names.

## What Worked

In some cases, middle school papers that were sent to my student's personal e-mail accounts via attachments actually arrived intact. When that happened, it was joyous! My students were amazed at the quality of the writing being sent and were eager to bring in their partner's work to share with the whole class. One of my students was stunned at the level of vocabulary her partner was using, incorporating words such as "chasm" and "oblique" into their story. I found that I had to allow some time during each class for my students to share what they had received, and discuss with their peers (and future colleagues) how best to respond. The excitement upon receiving their partner's work was palpable and contagious.

As the project progressed, I also sensed my students paying closer attention to reading assignments that focused on assessing student writing. No longer complacent receivers of information, my students now had a context within which to work and respond to the textbook. Issues such as "teaching grammar in context" and "self-selected topics" became real, as well as how to allow for such creativity when standardized testing requires many teachers to use highly prescriptive styles of writing. Issues that once seemed distant were now very relevant, and my students simply couldn't get enough!

## What Didn't

As happy as some of my students were when they first began to receive e-mails from their partners, others were frustrated. For some, attachments were unable to be opened due to differing platforms. What could be easily opened by some computers appeared as cryptic code to others.

For the first exchange, Linda had to physically carry hard copies of her student's work to my classroom. For technical reasons on their part, Linda's students were unable to send all of the papers to their assigned partners via the Internet. Rather than waste any more time, Linda felt it necessary to "get the ball rolling" by bringing the papers to us. Strike one. Our hope was to involve as little paper as possible, fully utilizing the technology with which we were so eager to engage. However, both sides were getting antsy, and hard copies of student work were better than no student work at all.

On the university side, questions arose as to the most efficient way to comment on student work. Since cyberspace precluded physically writing comments in the margins, my students found themselves commenting in narrative form to what they were reading. It was difficult for them to say, "Notice that in paragraph three, second sentence, you use the incorrect form of 'there.'" Comments such as this were tedious. Strike two.

My students and I also determined that scheduling conflicts played a major part in the failure of this project. First, the project was started in April. For my students, a new quarter was underway, but for Linda's middle school students, the year was winding down to a close. I felt that it was much easier for my students and me to stay focused in the absence of end of grade testing, activities, and general lethargy that tends to set in at the end of a long school year. Second, while my students had just returned from their spring vacation, Linda's students were eagerly anticipating theirs. I have no doubt that starting a major project such as this with spring break mere weeks away was difficult for Linda and her students. Strike three. Future projects will address topics such as choice of platform, utilizing comment tabs, and taking into account scheduling issues *prior* to the project's start date.

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# Students Perceptions of the Value of On-Line Instruction

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**Abstract:** This paper explored college students' basic perceptions of WebCT on-line instruction, focusing on why students chose or did not choose to use this format, tools and activities preferred, and if this format should be continued. The findings revealed that students did not use on-line instruction due to lack of computer access. Students who chose to use WebCT did so to access course materials and for e-mail connectivity reasons. Tools and activities preferred were accessing class materials and posting to the bulletin board. The majority of the participants indicated that on-line courses should be continued.

## Introduction

Online web based education is escalating at higher education institutions across the nation (Kearsley, 2000; Khan, 1999; Piccano, 2001). Today, students often have the opportunity to pick the way they would like to take courses, with possibilities including traditional face-to-face formats or some form of distance technology. Students also have the option of choosing to attend colleges or universities that offer courses in a format that matches their life style and learning preferences. Learning online, however, is much different than learning in a traditional classroom. Students must be more independent, be self-starters, have basic computing skills, and be disciplined with their time management skills. They need to be taught a new set of study skills if learning is going to be effective and meaningful to them in this type of environment. (Kearsley, 2000; Williams, 2000).

## Background Literature

Research examining why students elect not to use distance learning has identified several factors. These have included: the significant decrease in face-to-face interaction between the instructor and students in class; difficulty in participating in an on-line class with having access to a computer and basic computer literacy skills; changes required by the student to participate in the class using a distance format; lack of time to complete the course; lack of technical assistance when needed as computer related problems emerge; and lack of the time to complete Internet searches for the class (Berge, 2000; McKenzie & Davidson, 2000, O'Malley, 1999; Roblyer & Guarino, 1999; Weber & Schoon, 1998).

Research on why students choose distance technologies for instruction is not extensive. However, it is becoming an increasingly important area of interest as new and emerging types of distance technologies are being used with greater frequency in higher education institutions and business and industry. Several factors emerged from studies that have been completed: distance classes were convenient, matched students' schedules better than the more traditional face-to-face classes; saved students time; and provided collaborative opportunities (Barron & Lyskawa, 1998; Berge, 1998; Klesius; Homan and Thompson, 1997; McKenzie & Davidson, 2000; O'Malley, 1999; Roblyer & Guarino, 1999; Rose & Collison, 1997; Stokeband & Althoff, 1977).

## Purpose and Rationale

This study had several purposes. The first was to identify whether students would choose to access supplemental course materials provided on WebCT, and the reasons why they did or did not use WebCT. The second purpose was to identify whether students felt their use of WebCT enhanced the course, and if so which tools and activities they found the most useful. The third purpose was to determine if WebCT should be continued with these courses in the future. The information collected will provide formative information for future decision making in planning, implementing, and evaluating WebCT courses.

## Methods

### Participants

The participants in this study consisted of students in seven classes, both undergraduate and graduate levels, taught by the same instructor during the 1999-2000 academic year. All of the classes used WebCT as a course supplement. The same course tools and activities were used as consistently as possible by the instructor.

### Courses

During the 1999-2000 academic year the instructor had a joint appointment with two departments, the Physical Education Department and the Media and Instructional Technology Department. To collect a greater range of information on student perceptions of distance technology and whether students would choose to use this format if available, the instructor conducted a yearlong study. In the fall of 1999, students enrolled in two undergraduate classes in Physical Education Department (Health and Wellness and Introduction to Sports Management) were given a class that was enhanced by WebCT. During the spring of 2000 two undergraduate courses in the Physical Education (Curriculum and Instruction in Physical Education and Supervision) and one graduate class in the Media Department (Videotape Production and Utilization) were also provided an on-line enhanced course along with the traditional face-to-face instruction. Two graduate media classes were added to the study during the summer of 2000 (Administration of School Library Media Programs and Instructional Technology). Students were given on-line instruction through WebCT and encouraged to take advantage of the various tools and activities provided.

### Instrument

After reviewing the literature and talking with distance experts, the research team designed a one-page survey to collect preliminary data about student perceptions on the use of WebCT. The questionnaire consisted of both closed and open-ended questions. The closed-ended questions focused on student demographic data including student grade level, prior experience with WebCT, whether WebCT had been used in class, and whether WebCT had enhanced the class. Five open-ended questions were designed to collect information on student views of WebCT. These were: Why did you not choose to use WebCT? Why did you use WebCT? What WebCT tools did you find the most helpful? What WebCT activities did you like the most? Should WebCT be continued as a tool for teaching and learning in this course? Why or why not?

Before the instrument was administered it was pilot tested by a committee of distance experts. They were asked to review the instrument and add or delete anything they felt was necessary. Suggested modifications were made before the questionnaire was distributed.

## Data Collection Procedures

On the last day of each class the instructor distributed and collected the surveys. Students were asked to respond to the survey and write their names on the back for extra credit. They were informed the data would be kept confidential and used to assist in future on-line course decision making. The vast majority of the students, approximately, 98%, chose to participate in the study.

The closed-ended questions were analyzed using the Advanced Statistical Package for the Social Sciences (SPSS). In addition to frequency distributions, some of the data was analyzed using non-parametric statistics. Chi square tests were run to determine if relationships existed between WebCT use and selected categorical variables such as gender, student's grade level, content area, and prior experience with WebCT.

The research team performed a content analysis on the open-ended questions. Student responses to each of the open-ended questions were typed and collated into a data report. Responses were read multiple times by two members of the review team who have an extensive background in content analysis. Categories were extracted and agreed upon by the two reviewers from the reports for each of the research questions. The reviewers then individually reread the reports and coded the responses into the appropriate category. Several content checks were done to ensure content reliability. The reports were read and statements that did not relate to the question were thrown out. Second, an intraclass correlation was computed to estimate interrater reliability, r = .86

## Data Analysis and Results

Of the 161 students participating in this study, 93.2% (N=150) of the students chose to access and use WebCT course materials. Only eleven students chose not to participate in the on-line web based instruction. Their reasons for not participating fell into two major catergories: (1) difficulty locating a computer to get on-line with to access the course (N=4) and (2) technical difficulties when trying to access the class website (N=3). Other reasons cited were personal in nature; some students felt they learned more in class when they took notes while listening to the instructor talk (N=2), and one student did not have the time to learn the basics of navigating on-line web to access an on-line course (N=1).

Little relationship was discovered between student demographic factors and their use of WebCT. The majority of males and females used the online course materials, and no statistically significant gender differences (for p=.005) were found for WebCT use (see Table 1).

| | Gender | | |
|---|---|---|---|
| WebCT Use | Female | Male | Total |
| Used WebCT | 82 | 68 | 150 |
| Did not use WebCT | 4 | 7 | 11 |
| Total | 86 | 75 | 161 |
| Chi-Square | $X^2 = 1.333$, p=.248 | | |

**Table 1:** Use of WebCT Materials, Student Gender and Content Area

While 100% of the Media/Technology students accessed the WebCT materials and only 90% of the Physical Education students used WebCT, these differences were also not statistically significant (for p=.005). These results are reported in Table 2.

| | Student Content Area | | |
|---|---|---|---|
| WebCT Use | PE | Media | Total |

| | | | |
|---|---|---|---|
| Used WebCT | 98 | 52 | 150 |
| Did not use WebCT | 11 | 0 | 11 |
| Total | 109 | 52 | 161 |
| Chi-Square | $X^2$=5.633, p=.018 | | |

**Table 2:** Use of WebCT Materials and Student Content Area

There was also no statistically significant relationship between student's grade level or prior experience with WebCT and their use of the supplementary WebCT course materials. A few freshmen, sophomores, and juniors chose not to use WebCT materials, but all seniors and graduate students accessed the course materials (see Table 3).

| WebCT Use | Student Grade Level | | | | | Total |
|---|---|---|---|---|---|---|
| | Freshman | Sophomore | Junior | Senior | Graduate | |
| Used WebCT | 12 | 19 | 34 | 28 | 57 | 150 |
| Did not use WebCT | 2 | 2 | 7 | 0 | 0 | 11 |
| Total | 14 | 21 | 41 | 28 | 57 | 161 |
| Chi-Square | $X^2$ = 14.449, p=.006 | | | | | |

**Table 3:** Use of WebCT Materials and Student Grade Level

Generally, students who chose not to use WebCT had never been in a class that used WebCT, or had been in 5 or more classes that used WebCT (see Table 4).

| WebCT Use | Number of Courses with WebCT Components Taken Prior to This Course | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | 0 | 1 | 2 | 3 | 4 | 5 or more | |
| Used WebCT | 44 | 50 | 18 | 10 | 7 | 21 | 150 |
| Did not use WebCT | 7 | 2 | 0 | 0 | 0 | 2 | 11 |
| Total | 51 | 52 | 18 | 10 | 7 | 23 | 161 |
| Chi-Square | $X^2$ = 7.228, p=.204 | | | | | | |

**Table 4:** Use of WebCT Materials and Prior WebCT Experience

Of the 150 students who used WebCT, 94% indicated that using the online materials enhanced the face-to-face instruction. The main reasons students used the online course components were the ease of accessibility WebCT provided to course materials, the convenience it provided for communicating with the instructor and other class members on a regular basis, and it saved them time.

The type of on-line tools preferred by students were: class notes (N=120), bulletin board (N=93), e-mail (N=55), and the class calendar listing weekly course activities (N=26). Students indicated they liked to participate in a variety of activities on WebCT. The five most popular were: posting information on the bulletin board (N=44), accessing course notes (N=24), taking exams on-line (N=13), completing extra credit assignments that were made available on-line (N=9), e-mailing the instructor (N=6), and e-mailing other class members as needed (N=6). Table 5 summarizes the content analysis.

| Rank | Reason | N |
|---|---|---|
| 1 | The on-line learning component of the course provided quick access to course information | 62 |
| 2 | Communication between the instructor and students in class was enhanced through e-mail and bulletin board connectivity. | 42 |
| 3 | On-line instruction was convenient and saved students time (i.e., sending attachments instead of driving to campus to turn in assignments, having class on-line | 31 |

| | | |
|---|---|---|
| | rather than face-to-face meetings on campus) | |
| 4 | The instructor required students to participate in WebCT as part of class | 30 |
| 5 | On-line instruction provided students with course notes so they could spend more time listening to information presented in class. | 8 |
| 6 | On-line instruction provided an environment that encouraged students to explore and collect new and recent information in their area of study. | 5 |
| 7 | On-line instruction fostered an environment that urged students to share information with their peers. | 5 |

**Table 5:** Reasons Students Chose to Participate in Web Based On-Line Instruction

When asked if on-line courses should be continued, the overwhelming majority said "yes". One hundred and fifty five of the 161 respondents (98.7%) who completed this survey felt on-line instruction should be ongoing. Reasons students cited for supporting continuation of on-line course components included the ease of obtaining course materials at any time from any place, course organization and its helpfulness to student learning, and enhanced communication between the student and instructor. Table 6 summarizes these findings.

| Rank | Reason | N |
|---|---|---|
| 1 | Students have easy access to class materials any time | 32 |
| 2 | The web based on-line environment organizes course materials in a meaningful way, using a variety of tools, making it helpful in enhancing student learning | 23 |
| 3 | Communication between the instructor and students is enhanced | 23 |
| 4 | On-line learning is convenient and saves students time | 23 |
| 5 | Sharing of ideas is promoted in the on-line environment through the use of the bulletin board, e-mail, chatrooms. | 12 |
| 6 | Student computer and technical skills are enhanced through taking an on-line course | 6 |

**Table 6:** Reasons Web Based On-Line Instruction Should be Continued

## Conclusions and Future Directions

The overwhelmingly positive response students exhibited to the use of WebCT as a course supplement suggests that online course components are a valuable educational resource -- even when the primary mode of instruction is face-to-face. It is encouraging that almost all students chose to use the online resource, regardless of gender, grade level, area of study, or prior WebCT experience. However, the fact that some students did not use WebCT because they lacked computer access suggests that the digital divide will continue to be a factor for some students, and may limit the number of students who choose to engage in totally online courses. Colleges and universities must take this into consideration and provide computer access for students who may not have the means to acquire computers and Internet access individually. Other students indicated technical problems prevented them from using the WebCT course materials. Providing round the clock help-desk support can help students with personal hardware and software problems, but institutions also have a responsibility to assure that web servers are reliable and accessible at all times.

The online course components rated highly by students, specifically ease of access to materials and increased communication opportunities with the students and instructor, offer the potential to strengthen all instruction regardless of course delivery format. Posting course materials helps students discern course organization, and can help them organize their own study strategies. And, as a number of students noted, being able to download course notes from the Web frees them to listen more closely in class. However, for students who learn through the process of taking notes overreliance on posted notes may actually be a detriment. One possible solution to this quandary is posting an outline of course lecture materials prior to class. Students can download this material, and elaborate on the outline notes as the instructor covers the material. The communication tools, email, bulletin board, and chat, provide great support for student collaboration outside class and strengthen the development of true learning communities.

This study provides an initial look into why students use online course materials and what barriers discourage them from using those resources. However, this study was limited to students in two content fields at one university. Additional research should be done to determine if these findings are generalizable.

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# Connecting Trainee Teachers and School Mentors with University Educators via Multipoint Desktop Video Conferencing (MDVC) : The Singapore Experience

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**Abstract:** Computer video conferencing as a computer-supported collaborative learning (CSCL) technology brings learners closer to real-world environments and it provides increasing opportunities for learners to share experiences across time and space. This paper describes how multipoint desktop video conferencing (MDVC) is used in pre-service teacher education programs in Singapore to add value to the practicum. It enhances the professional development of trainee teachers and teacher mentors by allowing them to share ideas, experiences and resources in teaching and mentoring in real time with an audience wider than the schools where they teach.

## Introduction

The Multipoint Desktop Video Conferencing (MDVC) project at the National Institute of Education (NIE), Singapore, was launched in 1999. It explored the use of this new communications technology as part of initial teacher training at the NIE. It built on the high speed, broadband, island-wide ATM network, known as SingaporeONE which enabled schools and NIE to hold good quality MDVC conferences using ordinary desktop computers with ADSL telephone lines. Hence, the potential of MDVC in connecting people at different locations for discussions in real time was realised.

The project has two main objectives. The first is technical and developmental in nature, involving the practical feasibility of putting into place a reliable MDVC system that fully exploits existing technologies. The second objective is pedagogic in focus and is concerned with establishing how MDVC can add value to the professional preparation of NIE's trainee teachers, especially in the practicum component of the training programme. These objectives were achieved within two parts of the project - the 'Pre-Service Study' and the 'Mentor Study'.

This paper will document the development of this project and its current status, and present findings from studies made of the participants (trainee teachers and teacher mentors). It will discuss how these will help in moving the project forward, as well as the potential of MDVC in enhancing collaboration among trainee teachers, teacher mentors and university supervisors, thus adding value to the practicum experience for all.

## The Organisational and Technical Aspects of the MDVC Project

The project uses the White Pine CU-SeeMe Meeting Point server and end-user hardware and software. Schools involved in the project and NIE are linked to the project server over the SingaporeONE broadband network by ADSL telephone lines. It is possible to hold conferences with up to six participants, with adequate frame rates and smooth audio. Typical conferences last an hour or more. To achieve this quality of transmission, it had been necessary to agree on common settings for the CU-SeeMe software and to engage the help of the technical assistants from the schools both in maintaining the school equipment and in providing assistance to conference users.

With regards to the organisational aspects, it became clear from feedback from conference participants that MDVC conferences needed to be structured. Each conference group was allocated a time slot and members were told to join the conference at that same time each week. In addition, a conference programme with a clear agenda relating to different aspects of teaching/teacher mentoring for each session was drawn up.

## The Pre-Service Study

In the pre-service study, MDVC was used to link trainee teachers who were undergoing their practicum in different schools with each other and with the NIE supervisors/researchers. Throughout the duration of the practicum, the supervisors/researchers held regular time-tabled discussions with the trainee teachers regarding school attachment issues. In this part of the project, MDVC was used to :

- enable the trainee teachers to hold private discussions on matters relating to their practicum;
- help the trainee teachers to discuss practicum matters with members of the research team/NIE supervisors;
- collect basic quantitative and qualitative data related to the technical and pedagogic aspects of conferencing.

### Feedback from Trainee Teachers using the MDVC System

Responses from the trainee teachers were positive. Through these MDVC conferences they were able to discuss their practicum experiences with fellow trainees from different schools during the practicum period. They reported that a) they all experienced a wide range of problems; b) the common problems encountered were similar; c) it was helpful to talk to other trainees via MDVC; d) they felt less isolated; e) they were able to implement some of the ideas shared during MDVC; and f) they would be willing to have MDVC sessions again.

## The Mentor Study

The second part of this project, the Mentor Study, used MDVC to link together the School Coordinating Mentors (SCMs) in eight secondary schools. The SCM is a new role for senior teachers in schools. SCMs are required to oversee the management of the practicum in their respective schools. As the tasks and responsibilities presented new challenges to these teacher mentors they would benefit from networking with each other and with the NIE researcher via MDVC. To date, one batch of SCMs have used the technology for this purpose during a 9-week practicum period. They have been able to :

- share information on school-based mentoring programmes, and discuss the issues and problems;
- discuss and share case studies of teacher mentees, and the frustrations and rewards of mentoring.

### Feedback from School Coordinating Mentors (SCM) using the MDVC System

The SCMs reported that a) they felt positive about having the MDVC; b) they gained a much clearer understanding of their SCM role; c) they valued the networking opportunities provided and found the discussions very helpful; d) their confidence was increased, and professional development and effectiveness enhanced; and that e) their trainee teachers and cooperating teachers also benefited from these gains.

## Recent Developments

In the current phase of the MDVC project the researchers are exploring the feasibility of combining MDVC and the streaming of digital video clips made by conference participants of aspects of their classroom teaching. These clips are transferred electronically from the schools to NIE using the File Transfer Protocol (FTP). At NIE these are edited and placed in a password-protected area of the project WebPage on the project's video server. Trainees then video stream the clips and discuss them as part of their MDVC conferences. The SCMs during their own MDVC conferences will also make use of these video clips as a basis for discussing lesson observation issues.

## Discussion and Conclusion

The purpose of our project is to investigate whether and, if so, to what extent MDVC can improve the quality of the practicum. Thus our motivation as educators lies less in the technology itself and more in its pedagogic potential. Findings from the piloting phase have shown that MDVC conference participants were positive about their MDVC experiences. The benefits gained have added value to their practicum experiences and helped improve the quality of teacher preparation for them. Our particular interest is in how the MDVC technology can be further harnessed so that it will make a significant difference in reshaping teacher education, and education in general.

# LEARNING INTERACTIONS OF A WEB-BASED TUTORIAL PROGRAM AND THE IMPACT ON LEARNERS: THE USE OF THE WEB FOR EDUCATIONAL PURPOSES

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**Abstract:** Web-based Tutorial program was developed to serve as a supplementary classroom activities for freshman in Foundations of Computer for Education class. The program consisted of two types of learning interactions: human-to-computer interaction and human-to-human interaction. Online materials, lecture notes, recommended reading, and review tests were identified as human-to-computer learning interaction; whereas, human-to-human interaction was set up in form of learning activities for students via web-board, chat forum, and e-mail. The research was aimed at describing the relationship between two types of learning interactions, learners' factors (cognitive, affective and social culture domain) and learners' satisfaction to the use of the web as a learning tool. Artifacts were recorded. At the end of the semester, questionnaires were distributed to students. 130 questionnaires were completed. Among three types of motivation (task value, intrinsic, and extrinsic motivation), task value had a significant correlation with students' satisfaction to the use of web.

## Overview

Web is an innovative educational communication channel underlining a concept of learning alone with others. Learners must take their roles as activators constructing their own knowledge as well as contributing to others. In multi-nation virtual atmosphere, however, researches found Asian learners are mostly take their participation less than their counterparts. Presently, educational materials available on web are not pertinent to Thai context and no study has been conducted for how Thai students learn on web environment.

Web-based Tutorial program, then, was developed to serve as supplementary classroom activities for freshman in Foundations of Computer for Education class'1999. Basically, learning activities in the web were arranged via two concepts: Human-to-computer and Human-to-human Interaction. Online materials, lecture notes, recommended reading, and review tests were identified as human-to-computer learning interaction; whereas, human-to-human interaction was set up in form of learning activities for students via web-board, chat forum, and e-mail.

## The study

The research was aimed at describing the relationship between learners' factors --cognitive, affective, and classroom culture domain--, and learners' satisfaction to the use of the web as a learning tool in two types of learning interactions (human-to-computer and human-to-human interaction). Students responded to the questionnaire before they were introduced to the web. During the semester, students were strongly encouraged to use the web. Artifacts were collected. At the end of the semester, questionnaires were again distributed to students. 130 questionnaires were completed.

The results showed that there was a significant difference between students' feeling about making use of web for educational and general purposes. Students inclined to the use of web for general purposes. They tended to be satisfied with the human-to-computer interaction type when using the web tool. In classroom, however, students tended to prefer their learning with groups to learning by themselves. Among cognitive domain (prior knowledge about computer skill), three types of motivation (task value, intrinsic, and extrinsic motivation), and classroom

culture (study alone and with group); task value had a significant correlation with students' satisfaction to the use of web. Finally, statistics did not show a significant correlation between academic achievement and other variables.

Learning with web is still a new learning phenomenon for Thai students. Students felt that web was not for learning but for entertaining. Students passively used web for educational purposes. They appreciated the web for its delivering class materials. They tended to be satisfied with the web, when they realized the value of web in accomplishing their learning task (Velayo, 1994). Students participated in activities on web chat and web board for the main reason of completing class assignment rather than for their own wishes.

Furthermore, the study found that students' classroom culture inclined to be group learning, which should be able to be supported by human-to-human interaction via web. However, the study showed students' satisfaction to the web in human-to-computer interaction type instead of human-to-human type. This probably happened because students did not comprehend the application of web learning tool. They did not realize an educational potential of the web. The web was used as a passive media delivering necessary contents for their examination. Learning on the web is more than pre-instruction or content-based learning programs. Web is a value added of computer network capacity. Sharing sources of knowledge and learning interaction among users can be made to happen in online environment. During this early stage of adoption, Thai instructors who wish to integrate web to classrooms not only be careful in learning activities design, they must be aware of preparing their Students to develop set of skills in acquiring information, generating, and synthesizing their knowledge with others.

## Conclusion

In order to defuse the web technology as a learning tool, policy makers and instructors should shift the focus from students' technical training about web to educational aspect. The usefulness of the web could occur only when students become active learners: interact with educational contents and collaboratively learn with others via the web. When students realize how to make use of web as a learning tool and optimize its educational benefits by acting as active receptors and contributors; web increases its educational benefits and Thai scholars network will be expanded. The diffusion of such type of communication technology as web for learning will possibly grow in exponential rate (Rogers, 1995).

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# Compressed Video Technology and Innovative Teaching: Insight and Realistic Experiences of CVT Usage

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**Abstract:** Compressed video teaching with the VTEL TC2000©, teleteaching system, is a promising new technology that offers the opportunity to effectively teach a large number of students at both local and remote sites. With compressed video technology, the televised image and sounds of an on-campus course (lecture, discussion, and audio-visual teaching aids) are sent to compressed video classrooms at other locations, while the images and sounds of remote students simultaneously return to the on-campus classroom. Image and sound quality with this technology are excellent but (as with any new technology) effective pedagogy requires understanding the medium, prediction of pitfalls, and modifications in teaching techniques. The presentation will offer insights into effective compressed video teaching based upon the first-hand experiences of teachers who have presented compressed video, as well as technicians and directors who lay the groundwork for such courses

## Introduction

College administrators, faculty, and students are justifiably excited about the wealth of new teaching technologies that promise a revolution in pedagogy. Our colleagues often report being introduced to these technologies with either a "panacea" or "avoiding doomsday" scenario. In the "panacea" scenario, technology solves all of the ills of collegiate teaching ("it will increase your teaching effectiveness at least 100%"). In the "avoiding doomsday" scenario, faculty members are warned to "use ITT or lose it!" In this world view, ITT (Innovative Teaching Technology) is characterized as eventually populating the world with Disney©-spawned mechano-profs, lecturing remote students on-demand via the internet; and the "it" being lost, is "our jobs" if our University is not in the vanguard of such techno-wizardry.

CVT is one of the most innovative of the new technologies. Our presentation is designed to cut through the hype and explore the implementation and growing pains of Compressed Video Teaching (CVT) at a number of universities in Louisiana. The capabilities of CVT vary, but at a minimum CVT allows two-way simultaneous audio and visual communication between on- and off-campus classrooms. CVT also allows teachers to transmit any audio-visual materials (computer displays, overheads, video-clips, etc.) to remote sites. Thus, Local/Remote students see and hear everything going on in each classroom, for better or worse, much like a large single classroom.

This presentation concentrates on recommendations to teachers, administrators, and support personnel concerning what we have found to be effective and ineffective CVT practices, and strengths and concerns unique to this medium. The paper will begin with a brief method section that describes the equipment in a typical CVT classroom, and what it does. It continues with recommendations based upon CVT teachers and technicians' training and experiences, as well as the relevant literature. Advice will be presented in two subsections, one for faculty and another for administrators and technicians.

## Method

### Materials

The VTEL TC2000© System. The VTEL permits real-time two-way audio-visual (AV) communication between teachers and students at the local and remote sites, and provides an alternative AV source to send high-quality video (tapes, DVDs, CDs), computer animation, still-frame pictures, and/or sounds to remote locations (VTEL Corp., 1999). The picture and sound quality at both local and remote sites is equal to very good cable television. It should be noted that while an alternative video source is transmitting to remote sites, remote students can hear (but not see) the professors or their classmates at the Local Site, though the local site's view of remote classes is uninterrupted.

VTEL sites. The cost for each VTEL site varies depending upon the number of students per classroom and how much extra equipment is purchased beyond minimal requirements. To illustrate, total equipment costs for the least expensive site of which we are aware was $8,000, most sites range in price from approximately $14,000 to $18,000.

The Nicholls State site cost $28,000, was designed for 20 students and included the following major equipment: (a) the VTEL TC2000 Base System video conferencing equipment, with dual monitors, a Pentium based PC with CD ROM, and proprietary software plus one Sony© Pan Tilt Zoom (PTZ) camera, (b) one Cameraman© Presenter Camera System (capable of automatically focusing on the student at an "open" desk microphone, (c) ten Cameraman© Push to Talk desk microphones for the above, (d) two additional Sony© PTZ cameras (capable of panning throughout the room), (e) a Canon© Video Overhead Projector/Graphic Tablet Display, (f) two Boston Acoustic© speakers, (g) a wireless lapel microphone (for the professor), (h) four Sony© (35 in) screen monitors to display the alternative video source and remote class, (i) an additional Pentium II ©computer with CD ROM (this allows the professor independent control audiovisuals), (j) VHS and Beta videotape players, (k) an electronic whiteboard (capable of displaying dry erase markings on the remote monitors), (l) a 35mm Ectographic© slide projector, (m) wiring and remodeling. Naturally, these expenses are in addition to usual teaching furnishings, such as: podia, desks, tables, and chairs. In addition, the VTEL TC2000 system requires that the local and remote CVT classrooms be connected to each other by dedicated coaxial cable. The cost of cabling must be factored in as well.

It should be noted that often funding for remote sites may be provided or offset by other agencies or institutions which house the remote site (e.g. school systems, hospitals, civic organizations) which are eager to become part a CVT network. In Louisiana most CVT classrooms can be connected with each other.

A diagram of the local site is presented as Figure A. At Nicholls State, a director in the AV room has "input control", determining whether an image of the teacher, alternative input, etc. is sent to a monitor. At other universities, teachers may control the cameras/inputs.

Courses, Faculty, and the Director. The authors and their colleagues have taught a variety of graduate (Advanced Child and Adolescent Psychology, Introduction to Educational Research) and undergraduate (Introduction to Sociology, Basic Algebra, Basic English) courses via CVT at Nicholls State University and the University of New Orleans. All are senior faculty with a minimum of ten years teaching experience. The training

of the Director, varied from a Ph.D. in Mass Communications to an undergraduate student majoring in Mass Communications.

## Discussion

### Recommendations to CVT Teachers

The primary lesson that the current authors have learned about CVT instruction can be summarized as follows: "the same things that make a face-to-face lecture clear, informative, and engaging will make a CVT lecture clear, informative, and engaging". Students and Directors agree that if teachers come into the CVT classrooms and read their lectures into cameras, students will react by tuning out and turning off. The following are some things we suggest to avoid this.

Point 1. Vary the pace, activity, content, and focus of class. Remember is "variety is the spice of life." Change the various aspects of presentation to maintain interest. Avoid becoming a dreaded, 50-minute, talking head. Even the most diehard lecturers among us (CV'Teers) learned to vary the speed of presentation, move about the room, intersperse facts and theories with puns, jokes, songs, overheads (e.g. PowerPoints©), cartoons, and animations. On the subject of sights and sounds, our mass communications co-author constantly reminded the CV'Teers that CV is an AUDIOVISUAL medium, and that to be effective we had to engage our audiences' eyes, ears, and bodies. Too much of even a good thing (films, discussions, questions or even jokes) may become tedious. The current generation grew up watching MTV© and the like; they know what TV is supposed to look like, and make no mistake about it, they perceive CVT as TV! Bore them and they will tune you out! Even those of us learning to use the medium did so from time to time when presentations dragged.

Point 2. Please release me, let me go, cause I'm preparing CVT! It takes a lot of time to prepare for a CVT course, and professors should ask for release time. CV teachers cannot merely use their old lectures with this medium. The necessary changes involve a substantial time investment. CV teachers have to learn the equipment, this takes time. They have to optimize their presentations for CVT, this takes time. They have to create new materials, this takes time. They have to teach much larger classes, this takes time. CV teachers should get release time to prep each course.

Point 3. Have a director if possible; every TV show does. One of the advantages for those who taught at Nicholls was the presence of multiple cameras, so that what was on the screen (both local and remote) varied. The Director changed the camera feed as interest waned, focused and tracked presenters as they marched around the room, showed students who were "nodding off", "excited", or "making faces". We simply could not fall back into the talking heads mode even if we wanted.

All of the faculty who teach CV classes who were fortunate enough to have a Director, swear by them. They relieve the CV'Teers from having a "second ball in the air", teaching plus having to control camera/video feeds. We owe no small measure of our CVT success to the Directors who Nicholls State provided; and while many CVT setups make the presenter direct, this is a mistake and detracts from optimal CV instruction.

Point 4. Engage your audience. Captain Picard said it best; when he looked at the helmsmen and said "engage" (this is a S.T.T.N.G. geek test). Among the best CVT moments the first author had was when he asked members of the audience to stand and sing with him during a developmental lecture. It worked because it required students to be active and it brought the presenter and class together as a group. Student's stood (altering their posture and perspective) and followed a bouncing ball PowerPoint© presentation of the lyrics (varying the focus), sang (varying the activity), and loved it!

We are not suggesting CVT operettas, but professors must ask students things, hand them something (for Remote students you will have to plan ahead), have them move about, participate in class demonstrations, have them occasionally do something aside from listening. Active learning beats passive hands down. Passivity causes brain lock and robs both Local and Remote students of the opportunity to feel a part of the group. Remember, more than ever, you are entertaining, like it or not. That is what everyone is accustomed to watching on the tube.

Point 5. Dramatize. Have you ever listened to a professionally recorded novel on audiotape? If not, think of the last play you saw. Attention is best maintained when the presentation is made dynamic and real. Varying ones tone of voice, rate of speech, and general demeanor may do this. Gesture, move, and act. Not only does this maintain attention; it forces students to follow presenters as they move literally and figuratively.

Point 6. Never forget you are teaching ALL students in class - local and remote. Remote students are at a distinct disadvantage if the CV'Teer forgets to acknowledge students' existence at least every few minutes. It is especially good to learn their names and CV'Teers often should scan Remote Class's faces on the monitors. Remote student's only grip on the presentation is through the sounds and pictures emanating from the TVs. The grip is tenuous at best. Therefore, the CVT professor must remember to look directly at the camera as often as possible, not talk to the board, ask students questions, elicit comments and opinions, and encourage students to discuss with each other at both local and remote sites. Discussions are excellent. But try to avoid the development of a we (local) versus them (remote) mindset. We also suggest that professors deliver at least one presentation during the semester from each remote site. In-class student projects can also facilitate group involvement.

Point 7. Check both local and remote students for "fisheyes." Fisheyes appear on recently deceased halibuts after about two hours on ice. In humans they denote a lack of understanding or interest. Fisheyes staring at you are bad! An excellent way to avoid fisheyes is through organization and clarity. In service of this end, a co-author belatedly outlined his materials and presented them via overheads. But even with an outline certain rules have to be followed. Too many PowerPoint presentations make Jack or Jacqueline a dull teacher. Alternatives to lecturing do not relieve one of the responsibility to being the prime source of information. We know a professor who colleagues refer to as "Cecil B. de teacher" because of overuse of film clips.

Visuals should enhance the points made, not make them. They must remain teaching aides or adjuncts, not be mistaken for actual teaching. Avoid the curse of the "disembodied narrator" who becomes a spirit voice behind too many visual aides. This brings us to the next key to clarity, make sure the audience can read each overhead from every point in the local and remote rooms. Ways to facilitate this include presenting only key themes and ideas, and not trying to present verbatim lectures; clarity is often synonymous with brevity. Use short, telegraphic-style clauses and try to follow the "one slide - one or two points" rule, more points should equal more slides. The teacher is there to elaborate. Next, use a legible font of appropriate size on a clear background. If in doubt use too large a font, not too small. Certain fonts and background colors do not work at all. One must experiment in an actual projection setting before deciding on ones' usual slide design. However, occasionally by altering fonts and/or backgrounds, students may be surprised and interest piqued. Dramatic color or font may be used as isolated instances, but remember to present the same information immediately following in the more legible format. Check VISUAL and AUDIO clarity before beginning, and check them from all points in the local room. Assure that the same is done at all remote sites.

Point 8. If presenting outlines or graphics, always provide hardcopies. The best way to handle any visuals in a presentation is to provide reduced copies (three or four slides to a page) to local and remote students before commencing. We prefer to hand out such materials immediately before class so students do not lose them. Again, this requires planning for the remote sites. If students do not get copies and are not told that they have copies, they will try to compulsively write down every word on each overhead and avoid engaging their brains throughout the class.

Point 9. Plan and prepare, plan and prepare. Teaching Remote students necessitates a high degree of pre-planning, more than the typical class, and not only with respect to distributing handouts, but also the administration of tests and quizzes. Before and/or after class conferences with students can be problematic if the CV link to the remote site is turned on immediately before class and off immediately after class. Planning for this and other contingencies makes for a better class. Alternative methods for teacher to student contact are essential.

Check with a technician or director whether or not the VTEL and peripherals can do what you want. Time after time, when CV'Teers encountered problems, they had stretched the envelope with an untried peripheral or program. For example, one CV'teer stored a complex animation on a Zip© (100-megabyte high capacity) disk when there was no such drive installed on the computer; another, prepared a series of Macintosh© slides for a Windows©-based computer; and yet another tried to install new software onto a hard disk with no space left.

Point 10. Plan for disasters and have backup. What can go wrong, will go wrong, this is sometimes called the Titanic principle. Anticipating problems before they occur is better than trying to solve them afterwards. Imagine a planned PowerPoint© presentation but the computer or the program failed. It has happened. In one instance, the computer gen-lock which converts screen images to TV signals malfunctioned. Having backup (handouts of the overheads) saved the day. Consider what would happen if you lost audio to remote sites? Have a BIG magic marker and newsprint pad ready to write messages that they can see on the monitors. Know the phone number of the site. Know the closest phone on which you can call them long distance.

While the VTEL's have performed flawlessly since their installation, all has not always been rosy in technoland. CVT teachers have to have a working knowledge of the VTEL TC2000 and its' peripheral equipment and programs. This is critical if there is no Director. Backup plans for equipment failure must be decided on in advance. For example, on the first night of one class, the site was disabled when an oversized (jumbo) shrimp truck cut the coaxial cable.

Potential for problems increase with presenter's desire to use more VTEL features and peripherals. To illustrate, one of the authors prepared a PowerPoint presentation on spurious correlation. The two-minute presentation took approximately four hours to prepare, integrating animation with a sound track. While the presentation worked perfectly on the home computer, the Microsoft© computer audio program was out of date and could not processes the required audio format. The animation ran great, but totally devoid of sound. The presenter chose to hum the tune and provide the required audio as the silent animation crossed the screen. This could have been avoided if the author had heeded the Titanic principle.

Point 11. Practice, practice, practice. Not only are these the directions to Carnegie Hall, but to effective CVT presentations as well. It is essential to actually try out all aspects of the presentation in advance at the local site. Whenever new hardware or software is utilized, preparations should include a dry run without students. This dry run should take place long before class, while professors still have time to fix any difficulties. Only in this way can the presenter develop competence and skill with this promising new technology.

The above points are by no means an exhaustive list of everything teachers need to know about CV instruction. But we will follow some of the advice given in our Point 7 "clarity is often synonymous with brevity" and address some recommendations to administrators/technicians planning to introduce CVT to their campuses.

## Recommendations to Administrators and CVT Technicians

Administrators and CVT Technicians are often concerned with different aspects of CVT technology than teachers. Bearing this in mind we offer the following points for consideration.

Point 1. Plan, plan, everywhere a plan, and remember there is life after installation. Implementing even a minimal CVT setup involves YEARS (yes, YEARS) of planning. It has been our experience that universities plan for some of the things but forget others. Some universities are very good at getting equipment, but have no coherent plan how the equipment will be used. Planning is necessary for implementation and hardware issues like: (a) securing the funding; (b) selecting the sites (issues of availability versus potential audiences will have to be addressed), and equipment; (c) purchasing equipment (cost/benefit analysis and compatibility issues come to the fore); d) construction and installation (where will the equipment fit, soundproofing, accessibility); and e) debugging.

Planning is also necessary for: (a) which courses will be CV'ed, (graduate--fewer students but more dollars per student or undergraduate--larger potential population, but fewer dollars per student); (b) which professors will be selected (we suggest the best, most innovative and motivated teachers); (c) how teachers will be trained to use the equipment (this becomes especially important without a Director and we definitely advise against sink or swim, on-the-job-training); (d) if CVT doubles professors' workload, will they receive additional pay; (e) advertising that a course is available remotely; (f) who will manage the remote sites (if the door is locked who should the students go to); (g) how will professors physically get materials to remote students? The above is by no means an exhaustive list, but we believe we have made our point.

We would suggest that one person with adequate training oversee the process, rather than a committee. At Nicholls we have been fortunate to have a mass communications professor with a fundamental understanding of the media in charge, he and other involved faculty and staff have made CVT a success. But even with these resources there have been bumps in the road. Another good idea is to contact other universities and agencies already utilizing CVT and ask them for their assistance and suggestions. The Nicholls site was built in cooperation with a VTEL reseller, Contact persons for the reseller are presented as Appendix B.

Point 2. It takes money to make money. Any ongoing project involves continuing costs. Often universities implement new technologies for financial rewards. After CV is purchased, administrators may expect money to start rolling in. In fact, almost all technologies (computers included) have a start-up period when the university is actually losing money. People have to become accustomed to the equipment before it is used efficiently; but with proper PLANNING and implementation, this period can be minimized. CVT if effectively managed should be more than self-supporting; it should turn a profit.

## Conclusion

Is teaching by compressed video a panacea, or does it signal doomsday? As with most technologies, the answer is neither. Our own doomsday scenario consists of the following: without support, understanding, and nurturing from all sides (administrators, faculty, and students) CVT technology will not succeed. If it fails however, it does not signal doomsday, the students just won't take the courses. A bad CVT course, just like a bad regular course won't make. Any tragedy lies is the wasted potential of the medium.

We are convinced that with planning and vision, CVT will emerge as a beneficial new way to teach. The basic value of CVT is that professors can to teach students material they could not previously. CVT decreases the hassle of being a student. It offers easier access to courses and less travel time. CVT decreases the hassle of being an administrator. It offers the possibility of combining sites to "bring" more students into the classroom, and can ease scheduling. The true value of CVT however, may be that it forces professors to reform some tied old teaching strategies and begin to innovate.

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# The Imfundo Project: ICT in teacher education in developing countries

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Currently 130 million children across the world do not go to school. In many developing counties those that do attend school often leave functionally illiterate. Many teachers on sub-Sahara Africa are dying of HIV/AIDS, and in the worst cases more teachers are dying than are being trained and recruited. UK Prime Minister, Tony Blair launched the Imfundo project in April 2000 and gave the team six months to find ways to support the international quest for universal primary education by 2015 using educational technology. The decision was taken to focus on teacher education as the most effective way to improve both access to education and the quality of that education. This paper describes the project's findings to date and describes one of the pilot projects.

## Introduction

Well over 100 million children throughout the developing world do not attend school. While some regions including Latin America, the Caribbean and East Asia are on course to achieving universal access to primary education, other parts of the world are slipping behind. The problem is particularly marked in sub-Saharan Africa, where the number of children not in school is increasing. In1998 this figure was 42 million of whom 56% were girls. The Imfundo project was set up in March 2000 following a meeting in London between Tony Blair, the UK Prime Minister and John Chambers, President of Cisco Systems to consider how information and communication technology can be used to support education, particularly teacher training, in developing countries and be supported through a public-private partnership,

A project team was set up at the beginning of May led by the Prime Minister's private secretary for economic affairs; myself a specialist in the use of ICT in education, seconded to the project by Cisco Systems; a wireless communication expert from Marconi Communications; a business development manager from Virgin Direct, and three other members from the UK Department for International Development (DFID). The remit of the Imfundo Project was to concentrate on basic education, while supporting other forms of education and training only where it had a knock-on benefit for basic education (e.g. teacher training). In order not to increase the digital divide the project considered the way in which support can be provided for the education of marginalised communities and those who and have poor access to education, including those in rural areas and women.

The team chose to focus on teacher training, since HIV/AIDS is decimating the teaching profession across Africa. The number of teachers trained in sub-Saharan Africa will have to increase substantially if:

- primary and secondary gross enrolment rates are to increase from around 50% today to100% by 2015 (the year designated for the achievement of international targets)
- class sizes are to come down from around 50
- the loss of teachers to HIV/AIDS is to be offset by training new teachers

The international development targets mention the quality of education, but do not give it sufficient emphasis. Two thirds of children who go to school in sub-Saharan Africa leave school illiterate. About half of teachers in developing countries are unqualified in terms of their own country's formal standards for teachers' education. Teaching methods are often antiquated with an overemphasis on rote learning, and too

little learner-centred, outcome based. Another source of improvement is in the quality of educational management. Imfundo will address both these issues.

## The Project tasks

Imfundo was tasked to identify ways in which ICT could be used effectively to provide large numbers of new well-trained teachers, as well as developing the quality of teaching through extensive part time professional development programmes. This can only be achieved through high volume distance learning materials. There is neither the human or physical capacity to bring teachers out of schools into teacher training institutions, nor to substantially increase the number if initial teacher training places. Distance learning enhanced through ICT may be the only effective solution in terms of costs and scalability. Distance education for professional development offers a way to enhance the skills of teachers, to promote new pedagogies, facilitate the introduction of new curricula, and to support teachers, while leaving the teacher in the classroom to teach lessons.

However both computers and Internet access are relatively expensive in developing countries, compared to alternative uses for that expenditure, such as more teachers and books. This is both because of relatively high communications costs in developing countries, heavy duties on imports of computers and related resources, and more importantly, because the cost of labour, including teachers, is much lower. The improvement in quality of primary and secondary education resulting from their use would need to be significant to justify the cost of their use in classrooms.

Therefore, although the remit was to explore new technologies, the project team took the view that radio is currently the most cost effective ICT for enhancing the quality of education in the classroom. Radio remains the most widespread and accessible ICT in Africa. In some countries it has near universal penetration. The costs of producing educational material for radio are one tenth of the costs of producing material for television, which has much lower coverage and is more expensive to access. This will change as prices of technology and Internet access fall as they have done in developed countries. Therefore the team explored the use of radio in conjunction with newer technologies.

## Establishing teacher resource centres

In many African countries, our research indicated that it was possible to establish teacher resource centres in market towns, where there might typically be, but not always, access to power and telecommunications, which could be equipped with computers and Internet access. Teachers from the surrounding areas could then visit the resource centre from time to time (e.g. once per fortnight in term time) to collect materials and interact with other learners and the tutor.

There is not a straight choice between using new and old technologies in distance education for teachers. For example, where teachers were supported through resource centres, it would be possible to use radio for delivery of some of the training materials in schools, such as radio programmes that encourage teachers to engage learners more actively. Teachers would visit the resource centres from time to time to interact with others, watch videos or use interactive programmes delivered over the internet, collect new reading materials, etc. Imfundo are not aware of any teacher education programme that combines new and old technologies in this way, but it appears to have potential.

More work also needs to be undertaken on the opportunities for regional initiatives, to share technology, curriculum and infrastructure, across a number of countries. For example, it is significantly cheaper to adapt curriculum materials that have been produced in a neighbouring country than it is to start from scratch.

## Infrastructure

However many of the areas in which we are considering equipping teacher resource centres lack the infrastructure to support the use of ICT. Some have either no or unreliable electricity supplies and poor telecommunications facilities. Telephone call charges and ISP access are prohibitively expensive so any possibility of sustainability at the end of the funding period is seriously reduced. Wireless technology offers a cheaper solution while also arguing for deregulation on satellite communication. In some countries satellite technology can only be used to access resources and no uplink is permitted. Solar power can solve electricity issues, and as prices fall it is becoming a realistic power source . Indeed a private ISP in the Gambia powers 6 servers and over 30 computers on solar power and to date has never lost its connection. Additionally it appears that developing countries pay a high price for access to the internet. Developing countries who want to connect to the global Internet backbone must pay for the full costs of the international leased line to the country providing the hub. (More than 90 per cent of international IP connectivity passes through North America.) Once a leased line is established, traffic passes in both directions, benefiting the customers of the hub country as well as the developing country, though the costs are borne primarily by the latter. These higher costs are passed on to customers. The net cash flow is from the developing South to the developed North.

Costs of PCs are also high with high tariffs on the import of computer equipment. Therefore the sustainability of any project is difficult to foresee. One solution Imfundo was investigating was the dual use of teacher centres, either as business training centres, or for the delivery of other government services, such as training of health workers or agricultural extension workers, or the provision of women's services, so that the costs can be shared across a number of public and private services. Such centres can also facilitate e-commerce, by selling locally produced goods (notably agricultural produce, but also artisan goods) and cutting out the middlemen, or by buying products through the Internet for sale locally. Different pricing structures would need to be established for business and educational uses.

## Pilot projects

Imfundo is setting up a number of pilot projects set within sector wide approaches to education and therefore in close co-operation with Ministries of Education. The projects will test some of the educational ideas being developed about distance learning as an effective method of supporting both initial and inservice teacher training, and explore how the local and international private sector can help support the sustainability of the infrastructures required. The projects currently being discussed and explored are:

- Teacher training centres for the inservice training of 1000 secondary school teachers who have little more than secondary education themselves. Here distance learning materials will be developed and delivered through the traditional channels of video, audio and text and also through the Internet and facilitating the use of electronic forums;

- Equipping 2 or 3 rural primary schools with Internet connectivity to 3 computers to help in a new distance learning programme for pre-service primary teachers;

- An informal city learning centre to provide education for those children who cannot go to schools because of severe overcrowding caused by urban drift and to train teachers in this sector;

- Linking a teacher training college or regional resource centres to a network which will enable distance learning materials to be sent to the centres and making it easier for teachers to access training on a part time basis. (Often attending training is prohibitive as it means long journeys and time away from families and other responsibilities).

**Details of one of the pilot projects**

Rwanda was ravaged by civil war in 1994 that led to the loss of huge numbers of teachers. The shortfall was made up by a large number of unqualified teachers who were drafted in and comprising of people who have no more than secondary education themselves, and a few not having even completed that. An emergency short training programme on teaching methodologies was mounted in programmes of up to five days, but this was inadequate to meet their full training needs. This measure was less than sufficient for teachers to gain appropriate skills but all that could be done in a time when the priority was to rehabilitate and refurbish schools so that children could return to school with sufficient teachers to teach them.

Therefore there is a pressing need to develop both content knowledge and professional capability. In addition the number of secondary schools is rapidly increasing. Class size is usually around 40-50 but in some schools it can be nearer 70. 16% of children go to secondary school and this number is intended to rise to 20%. Teachers can not be taken out of school in large numbers for the extensive training programme that is required. In reality this should be at the very least a three year, full-time training programme and certainly equivalent to a pre-service programme in both subject knowledge and pedagogy. Removing teachers from the classroom for this length of time is unworkable and the teacher training institutions would have neither the physical capacity nor the human resources to train such large numbers.

It seems that distance education is the only feasible alternative, with teachers training while still teaching. The benefits would be to keep them in classrooms while undergoing training so school attendance targets could be maintained and it would allow teachers to put new ideas into practice so integrating theory and practice. A number of initiatives have been put into place in order to sensitise and develop the possibilities for the success of the programme. These included visits to head teachers and local education officers and identification of training centres in regional centres throughout the country that have telephone access and an adequate power supply. There are plans to staff these centres with a well-qualified teacher as a tutor and with an administrative assistant.

Head teachers have been made aware of the need to give teachers undergoing the training extra time to study by, for example, allocating them smaller workloads, exempting them from evening and weekend duties, and granting loans to purchase transport (bicycles or motorcycles) to support their travel to training centres. Part-time study for further qualification is becoming an accepted aspect of further education in this country so there is a firm belief that there will be heavy demand for these courses. Another problem the country faces is the capacity to develop distance learning resources. The initial costs of setting up such programmes are high compared to traditional courses, and there is lack of expertise in developing distance learning materials. This problem has been solved through donor funding to bring in distance learning expertise and a number of subject experts from other countries for a fixed time period to develop the materials and to train existing staff at the teacher training institution.

As in many developing countries the costs of books and other resources is high, and maintaining up to date libraries is expensive. Postal deliveries are unreliable or take a long time, so the exchange of assignments and materials would be slow and would also make student progress slow. Tutors based in regional centres would have to be expert in all secondary subject areas if they were required to support all students and any extra support from the central teacher training institution would be restricted to phone calls and post. Telephone lines are limited with very few lines available outside the country's capital.

*ICT as a solution*

A range of new and old technologies could help. Internet connectivity in each of the regional centres would provide teachers in training and the regional tutors with fast access to the central teacher training institution. Here subject specialists could respond in electronic discussion forums to questions posted by tutors or trainees; extra materials could be supplied digitally for printing at the local centre; and some interactive internet based resources could also be accessed by teachers after school and weekends, at times to suit them. Video materials could be sent via a satellite link or on videocassette; and up to date resources could also be accessed through the Internet.

Imfundo is currently in discussion with the Kigali Institute of Education to help them refurbish the identified centres, install a small computer network in each centre, employ technical support and to help integrate ICT into the programme. Imfundo are enlisting the support of the ShoMa foundation in South Africa to set up some Internet based activities to complement and extend the paper and video based materials, and will also make use of the Resource Bank to support the setting up of a computer conferencing system. The ShoMa project is already proving successful in using the Internet to train teachers in South Africa.

*Details of the training*

It is planned to integrate a modified version of the ShoMa materials into the programme, and Imfundo have facilitated personnel from ShoMa to work with the teacher training institution. The training will start at diploma level and develop to degree level as resources become available and teachers become accustomed to improving their skills through distance learning. Modules will develop knowledge in two subjects and in pedagogical skills, and will be based on the new four year full- time initial teacher training course that is currently in its third year of operation at the teacher training institution.

The original plan was to train 1000 students per year over 5 years but after further discussions it has been decided to roll out the programme more slowly opening two centres in January 2001, training between 50 and 100 teachers in each location. The training centres will come on stream in a phased progression and will be open six days a week, and there will be organised weekend and evening sessions as well as opportunities for teachers to drop in and use the facilities. Residential summer schools will be run of approximately two to three weeks duration in four identified locations across the country.

*Sustainability*

Technology is expensive, and even in developed countries the costs of maintaining and updating ICT is of concern. In developing countries, issues of sustainability have to be addressed not only in terms of the maintenance and renewal of equipment, but also in the provision of spare parts, qualified engineers and trained personnel to troubleshoot minor issues and train users. Many development projects have failed once funding has ceased because long term sustainability was not taken into account.

The ResourceBank is one way in which sustainability can be addressed. The international private sector are being asked to give support in terms of reduced costs for or donations of equipment, software etc, or to provide personnel to train local people or to project manage the establishment of the centres. Local private companies have been invited to make use of the spare capacity of teacher training centres to run basic ICT skills and adult literacy courses, and small businesses are to be encouraged to make use of the facilities for their own work at a small charge. In other words these teacher training centres will aim to double up as multi-purpose community centres. The development of the ResourceBank is discussed later.

## The KnowledgeBank

Additionally Imfundo have established a web based KnowledgeBank (http://www.imfundo.org) to provide analysis in the form of twenty to thirty short papers about the issues facing ICT and education in developing countries. The Imfundo KnowledgeBank will be an accessible, wide-ranging analysis of the opportunities for the use of ICT in education in developing countries, to be drawn on by anyone involved in this work. The KnowledgeBank will be continuously improved and updated in the light of experience and comments, and summarised in a report to which will be published in paper form. This data will enable all stakeholders and experts in each field to review and comment on it, and papers will be amended where necessary to reflect those comments, and updated in the light of the Imfundo pilot project experience.

## The ResourceBank

Our contacts with the international private sector suggest a widespread willingness to contribute time, resources and materials to education in developing countries, often on a concessionary basis. Therefore Imfundo has begun the process of establishing a ResourceBank of expertise and commitments from the private sector. Although companies have a range of motives for contributing to education in developing countries, few have the opportunity to make a contribution. Most companies do not have resources or expertise for project identification, or for working with recipient governments to identify how their expertise might contribute to strategic improvements in the education system. For most companies, an unaffordable large-scale effort would be needed to design and negotiate a project, and then to manage it.

The proposed ResourceBank is intended to facilitate private sector contributions and Imfundo will establish a database of pledges from the private sector. These might be pledges of expertise and time, of kit, software, content or of intellectual property. Imfundo will then work with donors and recipient governments to identify projects that support the education reform strategy and are cost effective. As the projects are developed and implemented, Imfundo will then draw down the private sector commitments, by asking the company to provide the resources they have pledged.

An aim of the ResourceBank is to provide a mechanism for partnership between the public and private sectors. For the recipient government and donor agency, it offers security that projects will be designed to deliver education and development goals, and will not be technology led. For the companies who contribute to the ResourceBank, it offers an opportunity to become involved in education in developing countries, without having to take on the task of project identification and negotiations with government.

It is important that donors Western private industry and government activities do not crowd out the activities of the local private sector (e.g. by undercutting the private sector provision of internet cafes or business bureaux). Imfundo and the Western private sector will work with the local private sector to provide support and assist with capacity building. Whilst 'bridging the digital divide' is not a direct concern of Imfundo, it would be foolish to ignore the synergies where they are of obvious connection and benefit. Successful collaborations with the local private sector are one of the best ways of ensuring sustainability.

## The future of Imfundo

At the end of six months the Imfundo team have reached the conclusion that educational technology does have a significant role to play in distance education of teachers and in information management in the education system; and that the private sector can make a positive contribution, and would welcome the establishment of an organisation which coordinated and channeled their resources into development-led, sustainable activities.

Over the next five years Imfundo will be developed as a centre of excellence in distance education of teachers, continuing professional development and in the management of information in education. The aim will be to use technology to *train* teachers, not simply to teach teachers *about* technology and *how* to use it in their teaching. Imfundo will be available as a resource centre for the Department for International Development regional offices, for other donors, for the private sector and for developing country partners. It will assist with project identification, design, monitoring and evaluation. Imfundo will specialise in drawing in the resources and expertise of the private sector, and analysing the opportunities for using ICT. This will include the management of a ResourceBank of private sector and civil society partners who are willing to provide expertise and resources on a concessionary basis. It will not fund the implementation of projects directly, though it will meet its own costs, and it will have a small fund for the identification and design of project proposals.

# The Handheld Web: Using Mobile Wireless Technologies to Enhance Teacher Professional Development

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**Abstract:** The project described in this paper represents an effort to more thoroughly infuse technology into the undergraduate curriculum for prospective mathematics teachers, while strengthening the relationships that already exist between the University of North Carolina at Wilmington and its partnership public schools. A key component of the project involves the use of Jornada 720 Handheld PC devices and supporting equipment/access, including a mobile telephone. This technology adds a new dimension to just-in-time training and support by allowing preservice and inservice mathematics teachers to be literally anywhere and receive information, collaboration and support using Web resources. The initiative represents a unique field application of mobile technology that has the potential to benefit not only universities and their students, but regional schools, teachers and their students as well.

## Background

After approximately ten years of innovation and development, the World Wide Web seems to have thoroughly pervaded U.S. society. Most Americans use the Internet daily to stay in touch with family and friends; colleges and universities have included instituting Web-based courses among their mission goals; top business priorities involve establishing and enhancing customer services on the Web; and television and other media are replete with Web addresses and Web enhancements for their programming and advertisements. It is difficult to imagine how the Web could become more integral to our daily lives. Yet, it appears that the next revolution is right around the corner, and this technological transformation has the potential to fundamentally change the way Web-based instruction and training is done.

Mobile wireless technologies are not particularly new. We have had cell phones with us throughout the 1990s, and whereas they might at first have seemed only a luxury or a novelty, in this decade they are viewed as more of an accessory and a necessity. An important change in mobile communications took place in the late 1990s with the introduction of digital (as opposed to analog) transmission technologies. Though a quiet innovation at first, with only a few companies such as Nokia taking advantage of the new capabilities, it is becoming apparent that two-way digital services may be the "next big thing" in wireless communications (AT&T 2000). This is because digital wireless can transmit not only voice but also data, and it is wireless data that many believe will be the dominant form of Internet communication within the next five to ten years (Lewis 2000).

A critical issue for teacher education today centers on the relationship, or lack thereof, between preservice and inservice teacher education. There often is little attempt to make the connection between preservice and inservice training, even though there exist many common needs. Partnership efforts such as Professional Development Schools (PDS) are one means of addressing this shortcoming. Additionally, advances in technology offer new opportunities for collaboration among preservice and inservice teachers. Specifically, novice and experienced teachers can both benefit from using the information and communication resources of the World Wide Web. An abundance of useful information related to curriculum and pedagogy is easily accessible for classroom planning and implementation. In addition, numerous opportunities exist for interacting online with other educators who have common concerns about important education-related issues. This kind of interaction benefits preservice teachers by supporting the development of concepts and skills,

while inservice teachers profit from multiple perspectives and continued opportunities for professional growth. The Web provides a flexible means of training that can be adapted to demanding work or student schedules for both of these groups of educators.

The author teaches undergraduate secondary mathematics methods courses at the University of North Carolina at Wilmington (UNCW), which employ the Web extensively as a tool for research, investigation and collaboration. In addition, over the past five years the author has directed a program of Web-based professional development for inservice teachers (Shotsberger 1999). Being "wired" has given both preservice and inservice teachers access to a world of information and interaction that was unheard of ten years ago, eliminating some, but not all, of the physical isolation barriers common to the profession.

Whereas the term "just-in-time" is used to describe this kind of computer supported learning, the truth is that even as physical walls are being removed between teachers, time constraints remain a huge barrier to collaboration. The causes of this roadblock range from limited availability of network connections at the schools to the problem of scheduling collaborative meetings within the constraints of a full teaching schedule (even at the same school).

We are now beginning to see programs targeting the constraints of time and place in teacher education. The present initiative was inspired in part by the LIVE Project, a three-year effort spearheaded by the Media Education Centre of the Department of Teacher Education at the University of Helsinki, Finland (Nummi, Ristola, Ronka & Sariola 1999). From the beginning, the LIVE Project has incorporated mobile wireless technologies to create open and flexible learning environments for preservice and inservice teachers and their students. Project researchers have found that teachers regularly choose to employ a range of communications technologies, sometimes simultaneously, including telephone, e-mail, fax and conferencing. Thus, a key aspect of establishing highly interactive, mobile learning environments is offering flexibility in terms of how to communicate, as well as intentionally honing participant skills in obtaining, managing and communicating information and ideas. Results of the LIVE Project have led its researchers to wonder aloud: "Is the future of teacher education in digital nomadism?" (p. 1092).

## The Project

The present project represents an effort to more thoroughly infuse technology into the undergraduate curriculum for prospective mathematics teachers, while strengthening the relationships that already exist between the University of North Carolina at Wilmington (UNCW) and its partnership public schools. A key component of the project involves the use of Jornada 720 Handheld PC devices (Fig. 1) and supporting equipment/access, including a mobile telephone. This technology adds a new dimension to just-in-time training and support by allowing preservice and inservice mathematics teachers to be literally anywhere and receive information, collaboration and support using Web resources. The initiative represents a unique field application of mobile technology, in the spirit of the LIVE Project, which has the potential to benefit not only universities and their students, but regional schools, teachers and their students as well.

**Figure 1:** The Hewlett-Packard Jornada 720 Handheld PC

The Handheld PCs were purchased through an on-campus grant program during fall semester 2000. The devices are being loaned out to secondary mathematics interns from January through May, 2001. Training will be conducted in January regarding the functions and capabilities of the technology for research, communication and reflection. Partnership teachers who express an interest in having another student intern assigned to them the following year will be allowed to keep the devices past May, 2001. In addition to the collection of evidence of use such as chat transcripts and messages posted on a discussion board, preservice and inservice teachers will be requested to keep an ongoing log during the spring semester of when, how, and for what length of time the Handheld PCs were utilized. Additionally, a survey will be given to each participant at the end of the semester to assess their overall impressions of the impact the technology had on their professional lives. Feedback from the logs and surveys will be used with the following year's secondary mathematics interns to better adapt the technology to their needs. The SITE 2001 presentation will include initial results from the project.

## Anticipated Outcomes

The Jornada 720 Handheld PC includes a full keyboard, Microsoft Office productivity software, a Web browser capable of handling HTML 3.2 and Javascript, handwriting-recognition software and the capability for recording short voice messages. These features expand a teacher's options for research, collaboration, record keeping and documentation, both in and out of class. It has long been lamented by the education community that teachers generally do not produce written or even oral records of the strategies they employ in the classroom. Handheld devices could give teachers a highly portable way of documenting the results of implementation, which could then be shared with colleagues face-to-face, in a chat, on a discussion board, or as a Web page.

For student interns and their partnership teachers in older school buildings where classroom wired network connections and telephone lines do not exist, or in the situations where these teachers "float" from class to class and do not have permanent room assignments, the capability of communicating via wireless devices provides an excellent way for them to stay in touch with colleagues and parents. Teachers no longer need to wait for access to a limited number of telephones or computers with an Internet connection. The realities of wireless data coverage in southeastern North Carolina are that an Internet-ready mobile phone is required in order to establish a reasonably fast wireless connection (56K) for the Handheld PC. This arrangement, while somewhat cumbersome, provides a very flexible platform to teachers, allowing them to research Web resources or contact parents or absent students at any time of the day. This combination of technologies also enhance Web-based professional development by giving teachers immediate (as opposed to delayed) access to other interns and partnership teachers by communicating asynchronously (message board), synchronously (chat), and by voice. A particular concern during spring semester 2001 is that one of the interns will be the only mathematics placement at a high school that is approximately 60 miles from all other placement schools. In that situation, mobile wireless technology will be a lifeline for ensuring that the single placement does not become isolated and discouraged in the absence of peer interaction.

In southeastern North Carolina, the majority of high schools are on a block schedule system consisting of four 90-minute periods. With fewer and longer periods, teachers have greater opportunity to collaborate with colleagues who have the same planning period. Unfortunately for teachers at smaller or rural schools, there may be only one or two teachers from the same discipline available for collaboration at any given time. Participants from different schools who possess wireless devices could notify colleagues of their availability to chat synchronously online, and if the chat is text-based, the transcript could become part of an archive asynchronously accessible by all partnership participants. With the added capability of surfing the Web while conducting a chat, these teachers would be able to jointly plan lessons that incorporate Web resources and that profit from the experiences and insights of a larger pool of practicing teachers. This would be especially

beneficial for preservice teachers, who often only have their partnership teachers with whom they can collaborate on a consistent basis.

Ultimately what is desired is a comprehensive understanding of how teachers employ this kind of technology on a daily basis and of the potential for the technology to transform classroom practice. Teachers generally do not lack for ideas of how to use technology such as the Web in their planning and teaching – they are constantly exposed to new practices through attendance at workshops and conferences. Rather, they suffer from an inability to implement new approaches due to a restrictive environment that is too often technology-weak. Nonetheless, the question of how extensively teachers will employ wireless technology placed in their hands is an open one. It is likely that some uses for this technology cannot be anticipated prior to implementation. Will the Handheld PC be used in place of the desktop computer, or simply as a supplement? Which features of the Handheld PC will prove most useful? Will the mobile phone be used simply for routine calls, or will teachers take advantage of paging and messaging features for contacting colleagues? A primary feature of the project, then, will be negotiations between the participants and the technology, which will likely, produce a number of unanticipated but desirable results along with the intended outcomes.

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**"Electronic/Distance Preservice Teacher Education – an example"**

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**Abstract**: Teacher Education in New Zealand traditionally has been taught internally and on campus by the Colleges of Education.

This paper and presentation will review how Massey University College of Education went about meeting the challenge of delivering preservice teacher education to those who, for a number of reasons, could not attend an on campus programme. Programme delivery will be outlined demonstrating the linkages between traditional extramural delivery and the use of WebCT for web based delivery. The results of surveys and studies of the students involved in the programme in the first four years of course delivery will be presented within the discussion.

Over the past ten years there has been a growing demand from the New Zealand Ministry of Education, the schools and the client base of teacher education to have preservice teacher education programmes delivered extramurally. Massey University has met this challenge. The advent of the Internet and the merger of Palmerston North College of Education and Massey University has enabled extramural delivery of the Bachelor of Education (Teaching) Primary degree. Massey University bought its expertise in extramural delivery of degree programmes and the College of Education its expertise in teacher education.

**Introduction**

Traditionally the delivery of teacher education world wide has been embedded in the notion that Universities and Colleges of Education are the repositories of knowledge and teaching and that the client should attend such an institution to participate in teacher education programmes. *"For over a thousand years universities operated under the assumption that information would be stored centrally and scholars would come to the central store of knowledge and collaborate to produce more information that would be stored at this site." (Ferry, Kiggans, Hoben and Lockyer 2000) p 496*

In the 50s and 60s the advent of extramural studies delivered through the postal system began, in some parts of the world, to shake that tradition. During these two decades a number of universities around the world pioneered the delivery of extramural studies to clients who were geographically distant from the institution delivering the programme. Many, like Massey University in New Zealand, retained "apron strings", in that clients were expected to return annually to the "repository of all knowledge and information", to attend on campus study days or weeks during the delivery of the course or paper.

The 80s and particularly the 90s have seen these notions of the client attending the repository of information shaken from its foundation. The tide of development in electronic delivery, telecommunications, email, and the World Wide Web have combined with business approaches and market models to force the providers to deliver programmes to the client at an access point suited to the needs of the client. Innovative providers have found that this delivery can be facilitated anywhere in the world through the World Wide Web. Ferry et al (2000) "thus, instead of people coming to the information, people can now have the information come to them" p 496.

In 1996 the College of Education at Massey University recognised the growing demand for teacher education to be delivered extramurally (the University coined the term externally) within New Zealand. The challenge had been thrown down by the New Zealand Ministry of Education, schools, and those of the public who, for a number of reasons, wanted to become teachers but could not access the traditional on campus programme. There had been a history of recruitment enquiries to the College of Education from many prospective clients wanting external studies leading to teaching qualifications. Reasons behind these requests ranged from geographic isolation through changed circumstances and finance to family circumstances.

The College acknowledged the need and a working party was set up to investigate the feasibility of launching an external Bachelor of Education (Teaching) Degree programme. Much investigation and debate centred around such issues as:

1. Were there enough prospective students out there who would be suitable (a) academically and (b) within the criteria of the New Zealand Teacher Registration Board to be registered as teachers in New Zealand?
2. Given government restrictions placed on funding for extramural study of university papers could such a Preservice Teacher Education Programme be financially viable?

Evidence from overseas (Daniel, 1996) indicated that entry level costs into the type of course proposed were continuing to be reduced annually making it feasible for all institutions to enter the online education world.

3. Would already busy staff at the College be prepared to accept the responsibility of adapting and re-writing papers to meet the needs of external and World Wide Web delivery?
4. Was there a scaffold within the World Wide Web which would support such delivery and was there evidence to support the assertion that the World Wide Web was a viable medium for course delivery and debate? The working party found the answers to all these questions to be yes.

*"When information comes to people via the World Wide Web, there are potential benefits. Such benefits include: direct access to a broad range of information; access to learning environments outside normal lecture and tutorial times; greater opportunities for experiencing a variety of instructional strategies including small group discussion and collaborative projects; and exposure to a forum for expressing and sharing ideas." (Lockyer, Patterson and Harper 1999).*

The Bachelor of Teaching (Primary); now the Bachelor of Education (Teaching) Primary Degree; External Delivery Option (EDO) was offered for the first time in 1997.

The degree mirrored the on campus programme with some restrictions placed on the optional Studies in Subjects for Teachers papers. Papers are studied internally and externally concurrently and Teaching Practice in schools is also concurrent.

In the first year, 1997,the programme was delivered by email using Eudora and, although this worked well, the coordinators had continued to search for a web delivery option that would allow greater real time collaboration amongst the students and the staff delivering the programme. WebCT was the supporting environment that was found to stand up to the scrutiny that the coordinators placed on finding an interactive environment which could handle reasonably large volumes of traffic. The College has used WebCT 1 for delivery since 1998 but will move to WebCT 3 in 2001. *"Networking technologies, both hard and soft, that make possible online instruction are evolving at a continuing rapid rate that keeps shifting the grounds of possibilities for increasing learner information interaction." (Carr-Chellman and Duchastel 2000)*

1997 and 1998 saw fifty well qualified students selected into the programme. The restriction of fifty was placed on the programme to maintain quality of service during the initial development of electronic delivery. In 1999, 2000 and into the foreseeable future the intake will be restricted to 70 clients. The College maintains that given the level of service expected by the clients and the continued excellence of delivery the College wishes to maintain, 70 is the maximum number of clients the programme can sustain in any one year group. To go beyond this number would risk compromising the quality of delivery of the programme.

**The Online Structure (see figure 1)**

The first four years of the programme saw it structured around four sites supported by WebCT Version 1.0. All sites provide for whole group interaction, EDO chat group discussion; these are sub groups within the year group of 5-8 students and are private to the group; and private email facilities.

1. The Main Site: all students and staff have access to this site for general discussion, which in most cases is initiated by the programme coordinators. Students are discouraged from initiating discussion in this site or in the year group sites. However, there are times when students do initiate site discussion. Discussions generated around this site are usually of an administrative or programme structure nature. Socially the site is used to announce news of the birth of new babies, social gatherings, lecturer visits to particular locations where students may want to meet with them etc. On this site the weekly College newsletter, Stupot is posted. The EDO group are the most regular contributors to this publication.
2. The three Year Group Sites: There are three separate sites, one for each year group and allow the students within the year group to interact over matters pertaining to that group. Within each year group site students are sub divided in chat groups and paper forums; one forum for each paper.

Chat groups are groups of to 5-8 students formed to facilitate close small group discussion about topics generated within papers. The chat groups are private to that group of students. Staff do not have access to chat groups.

Paper forums are set up for all students enrolled in particular papers and the staff member who coordinates that paper. Staff generate weekly focussed discussions within each paper forum on the paper theme for that week. These discussions, which also include discussion of assignment topics, take place in EDO discussion groups. They have the same personnel make up as the chat groups. EDO discussion groups are a simulation of the internal groups that form on campus by chance and out of in class interaction. Staff are encouraged to take an active part in discussion that emanates in the paper forum. Students who take an active part in these forum report as do staff that they gain a great deal of personal satisfaction and academic growth from the stimulation that ensues from this form of discussion.

Thus there are a number of forum both public and private which encourage dialogue between student and student and student and staff bearing out (Tinker 1997). *"The principal way of encouraging student dialogue in the pursuit of learning is the availability of online forums, where the entire learning community can participate in an intellectual exchange profitable to all."*

**The Online Environment**

WebCT is the electronic software programme used to enable the students and staff to work in an interactive online learning environment. Clients are delivered through the postal service a set of paper based study guides, one for each paper, at the beginning of each semester. Activities for online interaction are built into the study guides and are initiated by lecturers during their online work with students. The students are encouraged to develop these interactions amongst themselves on a weekly basis for each paper in EDO chat groups (fig 2). Taking turns, one student from each group reports their interactions back to the paper coordinator/staff member.

Students report that the asynchronous environment allows time for reflection before comment and that this is a feature of their communication with others. Online discussions certainly have different time frames to face-to-face discussions. A typical time frame for online discussion has been found to be 7-10 days although discussion may proceed for weeks. 1-2 days would be a fast response within this environment. This does happen particularly when students have pressing, urgent interactions to make.

One of the original aims of the programme was to provide an interactive learning environment for the students and to a considerable extent this has been achieved, despite the fact that, to date, it has not been compulsory for students to participate in online work.

The 'learning community' notion is not always welcomed for several reasons. Some of the more traditional students see study as individual. They do not want to share and do not expect others to share. These students communicate only rarely during the semester. Staff and fellow students find themselves asking if this response is appropriate behaviour for one who is about to join the teaching profession. We think not and this has prompted the coordinators to initiate a signed agreement for the 2001 group. Interaction will be compulsory and will be reviewed with the group at the end of semester two 2001. A portion of paper assessment will be based around these interactions.

Students report continued annoyance when members of chat groups choose not to take part but also report that, for them, online collaboration is the first dispensable component of the programme when they come under constraints of time, especially at the end of the semester.

In 2000 this manifested at the end of semester two when students had four assignments to complete immediately after a two week full time school placement and examinations beginning one week later.

**Technical Support**

Staff are supported in the WebCT environment at three levels. The programme coordinators give a small degree of collaborative support when and where they can. A full time technical administrator administers the overall sites. This person enters all staff and students into appropriate groups, assigns passwords, and gives individual technical support to staff. Finally staff have access to the central helpdesk of the University Computing Services Department. Students are supported at a number of levels. The full time technical administrator is available to them at all times when the university is in session. The staff and in particular the programme coordinators give academic technical support as and when needed and the student body are brilliant at giving collaborative support to one another within and across year groups. The main site is a source of collaborative technical support between staff and students and students and students. Technical problems are the main reasons for students initiating communication on the main site.

**Problems Faced**

There have been relatively few problems with the programme delivered through the web. The nature of some interactions/non-interaction between students has already been discussed as a source of some frustration.

An ongoing problem which it is hoped will be overcome with the move to WebCT 3 has been the fragility of the environment at some times, particularly when traffic volumes are heavy. This is not necessarily the fault of WebCT but is embedded within the support network and servers of the university. As the use of WebCT has increased so has the fragile nature of the environment. The University has upgraded the server in 2000 and this has bought greater stability.

Students are selected with the full knowledge of the hardware and software requirements demanded by the delivery of this programme in the WebCT environment. However it is one thing to communicate the need to such frameworks but another to be sure that students obtain specified computers. When students do not upgrade they report problems with speed of access and continuing access to the course forums. At these times staff note that the interactions from such students decreases.

In some instances the isolated geographic location of some students is a problem. Telecommunication lines in some remote locations are fragile and can cause major problems when they go down for long periods of time. Students and staff have learned not to compose in WebCT. They risk the loss of pieces of work. Coordinators recommend to all staff and students who are working in WebCT that they compose in a word processing programme then cut and paste or attact the document in the communication being composed in WebCT.

Finding the time staff training is a continuing issue which causes later problems for coordinators when students become frustrated over communication problems with staff. In 2001 the coordinators are instigating a peer support system for staff where a staff member established in WebCT will pair off with a new staff member and give technical support to that new staff member.

Teaching Practice, which is the placement of students in schools on some days, placement days, and for up to six continuous weeks was identified early as a potential difficulty. Students are placed with a practising teacher who has been recommended as a suitable role model during these times. Many of these placements are remote making it difficult for the College to monitor the student and the associate teacher. Every effort is made to have a staff member visit students every

time they are in school placement. Isolation, travel restrictions and time restraints do not always allow this. The World Wide Web has not been used to support this function. A feasibility study for this will be carried out in 2001.

**The Future**

As the EDO programme has evolved, change has been inevitable. The most dynamic change has come in the basic structure of the course in terms of its demographics. In its purest form, which is how the course was set up and was the vision for the course, year groups were to remain intact. It was believed that the selected group had such academic potential that they would no fail. The reality has been different. For a variety of reasons students do fail or pull out of papers and as a consequence the dynamics of each year group has changed. In 2000 the dynamics of all groups is such that each has students across year groups. Reasons include: family dynamics, time constraints, paper fails and the group of students who join the programme having been given cross credit for previous study or having completed up to four papers within the programme part time before entering the programme. A further dynamic has come from the group of internal students who transfer into the EDO programme and the group of students who transfer into the programme from other college and university programmes. Figure 3 illustrates the dynamics of those studying across year groups in the year 2000.

In 2001

1. all students who transfer into the programme from an internal programme or another College of Education or University will be interviewed to establish that they are ready for online external teaching and that they match the dynamics of the group.
2. A greater emphasis will be put on paper forum. It is envisaged that students who find themselves working in two year groups will identify with the paper forum rather than the EDO year group forum.
3. The annual survey of students had always indicated that students strongly disagree with all material being online. Carr-Chellmann and Duchastel, 2000 speak of the study guide as the student's main reference to the content, structure, and activities associated with the online course. In 2001 one paper will be delivered totally online and carefully monitored as to how the students cope with the dynamics of this form of delivery. It has been the study guide that has always been physically posted out to the students yet Carr-Chellmann and Duchastel assert that online study guides work for them. They point out that, *"online study guides must provide a level of detail that is sufficient to enable the learner to proceed without substantial further personal interaction or clarification from the instructor.*
4. WebCT Version3 will be used as the medium for programme delivery from 2001 onwards.

**Conclusion**

This paper limits its discussion to the current operation of the EDO programme of Massey University College of Education. The programme has met its main objective; the creation of a supportive, interactive, online environment for distance students that enables those students to gain a preservice teacher education qualification recognised by the New Zealand Teacher Registration Board. This qualification is the Bachelor of Education (Teaching) degree.

Proof of the success of the programme lies in the graduation of the first 36 students in May 2000. A further 41 students will graduate in 2001.

Reeves and Reeves (1997) stated "despite all the interest, little research evidence exists to support claims for the effectiveness of web-based instruction." (p 59)

The success of this programme provides further evidence of the potential of WebCT as an online environment for the delivery of off campus learning. In the year 2002 a second Teacher Education Undergraduate Degree, the Bachelor of Education (Teaching) Early Years – birth to eight years will be offered based on the model developed for the primary programme.

The concluding comment is left to one of the 2001 graduating group, "I have surprised myself and my family in reaching a lifelong dream; that of becoming a teacher and I have done it without ever going on campus. I will see you all at graduation."

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**Figure 1**

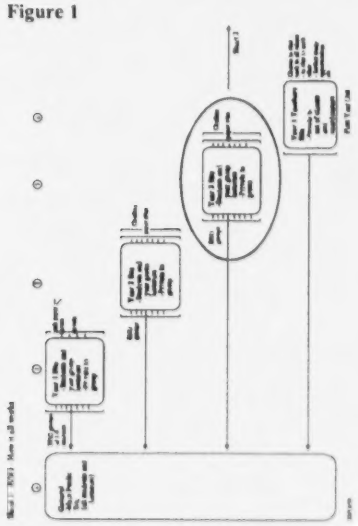
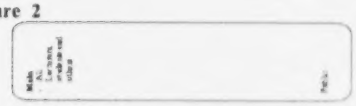


**Figure 2**



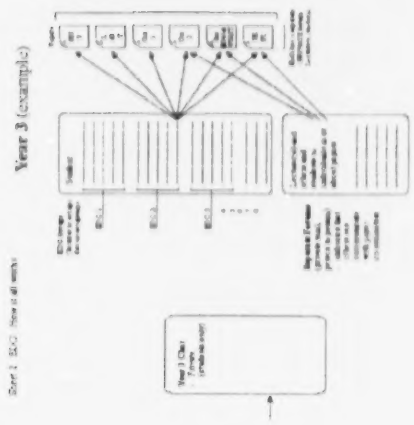


Figure 3

## Current distribution of students in the EDO programme (2000)